SV180/SV18C SmartView

180mm Paperless Data Acquisition System
User Guide
P/N MO100202-01

Revision H

Thermo SCIENTIFIC

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Preface

This user guide documents the operation and technical information for both commercial grade and controlled program recorders.

Commercial Grade Recorders

When referencing parts used on commercial grade recorders, refer to drawings ZM100133-01 and ZM100134-01 (Chapter 11).

Controlled Program Recorders

When referencing parts used on controlled program recorders, refer to drawings ZM100133C01 and ZM100134C01 (Chapter 11).

Recommended Spare Parts

Reference Appendix B for both commercial grade and controlled program recorders.

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Chapter 1
Product Overview

Introduction

Thermo Fisher Scientific's SV180/SV18C SmartView 180mm paperless data acquisition system centers on providing engineers, operators, and technicians with an intuitive, scalable, and easy to maintain data acquisition platform. The recorder facilitates process optimization and reporting via seamless integration with existing control systems and other Thermo Scientific data acquisition systems. All data is stored in ASCII or binary format and may be archived or analyzed on any PC running Microsoft® Windows® 95, Windows® 98, Windows® 2000, Windows® XP, or Windows NT®. The recorder's features are accessed via a series of menus, and each menu level features easy to follow prompts, simplifying operation.

The standard recorder can measure and process up to 80 direct inputs with a maximum of 999 calculated, conditional, or external points for logging, trending, or data manipulation. Direct input sources may come from voltage, current, dry contact, thermocouple, or resistance temperature detector (RTD) sources. Recorders with multibank functionality can accept a maximum of 80 locally multiplexed points and 840 remote multiplexed points.

The ProView Plus software is Windows-based and may be used to configure the recorder and view historical data. Additionally, real-time data may be viewed in any of the screen formats available on the instrument, and configuration files may be downloaded to disk or directly to the recorder using the Ethernet port.

Specifications

Operating

Table 1–1.

Operating specifications	
Input capacity	Optional: 16, 32, 48, 64, or 80 isolated direct analog inputs (up to 999 total points including calculated and external inputs) Optional: Maximum of 80 locally multiplexed points Optional: Maximum of 840 remotely multiplexed points
Input signals	DC voltage: Linear and square root; full scale bipolar ranges include 50 mV, 100 mV, 200 mV, 1 V, 5 V, and 10 V DC current: Bipolar 4-20 mA, 10–50 mA; dry contact Thermocouple: J, K, T, E, R, S, B, C, Nicrosil Nisil, and Nickel/Nickel Moly External: Computer generated Optional RTD: 10-ohm Cu, 500-ohm Pt 385, 100-ohm Pt 385, 100-ohm Pt 392, 200-ohm Pt 385, 200-ohm Pt 392, and 120-ohm Ni Optional SM100 point types Optional Modbus master point types Optional MM120/MX60 point type (multibank units only)
Accuracy	Voltage: ±0.05% of programmed range Current: ±0.1% using external shunt Thermocouple: ±1°C for J, K, T, E, Nicrosil Nisil, and Nickel/Nickel Moly; ±3°C for R, S, and C; ±4°C for B RTD: ±0.5°C
Resolution	0.006% of full scale
Impedance	>10 megohms
Common mode voltage	300 Vac p–p
Common mode noise rejection	120 dB at 50/60 Hz
Normal mode noise rejection	60 dB at 50/60 Hz
Scan rate	Standard: All points scanned every second (16–80 inputs), nominally Optional: Remote multiplexers scanned at approximately 15 points per second

Recording

Table 1–2.

Recording specifications	
Recording Rates	User programmable, sample rate interval from 1 sec. to 24 hr.
Format	ASCII or Compressed Binary
Internal Memory	8 MB of Flash memory, 64 MB of DRAM, 512 kB NVRAM memory
Storage Media	1.44-MB (3.5-in.) floppy disk or PCMCIA ATA Flash card
Data Saving Method	Programmed points may be assigned freely to a total of 32 groups; any two groups may be stored to media
File Types	Historical data file, alarm/event file, and configuration file

Display

Table 1–3.

Display specifications	
Type	12.1-in. Color active matrix, TFT LCD
Resolution	800 (H) x 600 (V) pixels
Modes	Maximum of 9 user-defined screens
Colors	Maximum of 40
Update rate	250 msec.
Virtual chart speed	User programmable in in./hr. or mm/hr.
Virtual chart scales	User programmable
Screen Capture	Any screen captured to .bmp file by event switch input or Modbus command

Features

Table 1–4.

Features	
Math package	Algebraic equations (basic math, powers, roots, natural and base 10 logarithms, exponentiation), conditionals (Boolean logic), moving average, hi/lo peak, timer, rate of change, totalize, timed average, programmable linearization curve, and logarithmic
Buffer browse	Enables real-time browsing of historic chart data independent of recorded data; equivalent browse capability approximately 560 pen inches (5.5 days for 4 pens at 1 in./hr.)
Media browse	Enables browsing up to last 200 historical day folders
Disk full alarm	User may set disk full threshold; disk errors and alarms can be routed to contact closure
Trend direction	User may select horizontal or vertical chart trending; scale pen pointers or scale bargraph indicators for easy trace identification

Alarm Functions

Table 1–5.

Alarm functions	
Number of alarms	Maximum of 5 alarm set points per point
Types	High, low, rate, abnormal
Contact output/input	Maximum of 16 isolated Form A or B contact outputs and 12 digital inputs per card; 5 cards maximum
Contact ratings	1 A at 117 Vac or 26 Vdc resistive load; 0.5 A at 230 Vac resistive load; 0.4 A at 250 Vdc resistive load
Common alarm	1 rated at 100 mA at 250 Vdc/Vac
Deadband/Fail-safe	User selectable

Power

Table 1–6.

Power specifications	
Requirements	100–120/200–240 Vac, 0.6/0.3 A, 50/60 Hz; 90–125Vdc; or 18–30 Vdc
Consumption	40 VA maximum
Power fail protection	Programmed parameters stored in nonvolatile memory; clock retention in BBRAM approximately 12 months; retention time without power >12 months; instrument configuration retention in Flash memory approximately 10 years; chart and alarm browse buffers preserved
Transmitter power supply	24 Vdc at 2 A

Communications

Table 1–7.

Communications specifications	
Serial ports	2 ports, RS232 and/or RS485 communications with Modbus (RTU and ASCII)
Parallel printer port	Screen print, alarm/interval/time of day logs (future support)
Network types	Ethernet (10/100 Base-T), TCP/IP, TCP/IP Modbus, OPC/PI compliant
File transfer	Automatic and manual transfer from host computer
FTP server	Directory operations on external storage media
Transferable files	Data files, alarm/event files, configuration files
Real-time monitoring and external data storage	ProView Plus software, OPC Server software, or any compatible PC-based network

Environmental

Table 1–8.

Environmental specifications	
Operating temperature	Floppy drive: 39ºF to 122ºF (4ºC to +50ºC) PC card: 32ºF to 122ºF (0ºC to +50ºC)
Operating humidity	10 to 90 % RH, non-condensing
Enclosure	IP65 from panel
Dimensions	Bezel: 11.34 x 11.34 in. (288 x 288 mm) Cutout: 11.1 x 11.1 in. (282 x 282 mm) Depth: 23.5 in. (9.3 mm)
Weight	Approximately 21.6 lb. (9.8 kg)

Qualifications

Table 1–9.

Qualifications	
Nuclear	Seismic (IEEE 344-1987), EMI/RFI (EPRI TR-102323), Software V & V (IEEE std. 7-4.3.2-1993), 10CFR 21, 10CFR 50 Appendix B, and IEEE 323-1983 (mild environment)

Factory Recommended Compact Flash Cards

Table 1–10.

Card Size	Thermo Fisher P/N
64 MB	PA100259-02
128 MB	PA100259-03
256 MB	PA100259-05
512 MB	PA100259-06
1 GB	PA100259-07

Flash cards require a compact flash to PCMCIA adapter (Thermo Fisher P/N PA100260-01)

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Chapter 2
Installation & Wiring

Equipment Handling

Initial Inspection & Unpacking

Carefully unpack the instrument from the shipping carton. The instrument is packed in a shock-proof foam retainer to prevent damage during normal transit. If damage to the shipping carton is evident upon receipt, ask the carrier's representative to be present when the instrument is unpacked and refer to Appendix A for return information.

Remove the foam retainer and instrument from the shipping carton. Carefully remove the instrument from the foam retainer. If damage is detected after unpacking the instrument, repack the instrument and return it to the factory as described in Appendix A.

Storing the Recorder

If the recorder is to be placed in storage for a long period of time before installation, repack the instrument in the shipping container. Cushion the recorder with foam molding or an equivalent and store in a cool, dry area. Due to battery life, we do not recommend storing the recorder for more than one year. If longer storage time is required, contact Thermo Fisher for additional storage information.

Installation

Environment

The instrument is designed to operate in the following environment:

- Indoor use only
- Temperature: Floppy disk: 39°F to 122°F (4°C to +50°C);
  PC card: 32°F to 122°F (0°C to +50°C)
- Humidity: 10–90 % RH non-condensing
- Operating power required: 100–120/200–240 Vac ±10%, 0.25/0.15 A, 50/60 Hz; 90–125 Vdc; or 18–30 Vdc

Table Top Mounting

Warning The recorder should be considered as permanently connected. Disconnection from the supply MUST be possible via a customer-supplied switch or circuit breaker. This disconnection device should be clearly marked, in close proximity to the recorder, and easily accessible to the operator. ▲

Panel Mounting

Warning The recorder should be considered as permanently connected. Disconnection from the supply MUST be possible via a customer-supplied switch or circuit breaker. This disconnection device should be clearly marked, in close proximity to the recorder, and easily accessible to the operator. ▲

The instrument is sized to fit in an 11.1 x 11.1 inch (282 x 282 mm) panel cutout and requires 9.12 inch (232 mm) behind panel depth. Actual dimensions of the instrument are shown in Figures 2–1 and 2–2. The recorder can be mounted at most any angle. Ensure that you have the proper clearances.

1. Cut a panel opening that is 11.1 x 11.1 inch (282 x 282 mm) in the installation location. If you are installing multiple recorders side by side, refer to Figure 2–2 again. The section labeled “PANEL CUTOUT...” depicts the minimum spacing requirements between recorders.

2. If not already done, remove any packaging material from the recorder. Always handle the unit carefully to avoid damaging the display or scratching the touch screen surface.

3. If necessary, remove the four rubber feet from the bottom of the recorder.

4. Insert the recorder into the panel opening from the front.

5. **For Seismic Only** (continue to step 6 for non-seismic installation): Slide the retainer plate over the end of the recorder. Slide the plate up to the panel (refer to Figure 2–3).

6. Hold the recorder firmly in place against the panel, and install one of the jackscrews by inserting the jackscrew nut into the keyhole located on the side of the recorder case. For seismic installation, ensure that the jackscrew traps the retainer plate against the panel.

7. Using a screwdriver, screw the jackscrew leadscrew in until the jackscrew holds the panel against the front of the recorder bezel. Do not completely tighten the leadscrew at this time.

8. Install and tighten the remaining jackscrew into the keyhole located on the opposite side of the recorder case as described in steps 6–7.

9. Using a screwdriver, tighten both jackscrew leadscrews until the panel is held securely against the recorder bezel. Recommended torque is 30 ±3 lb./in.

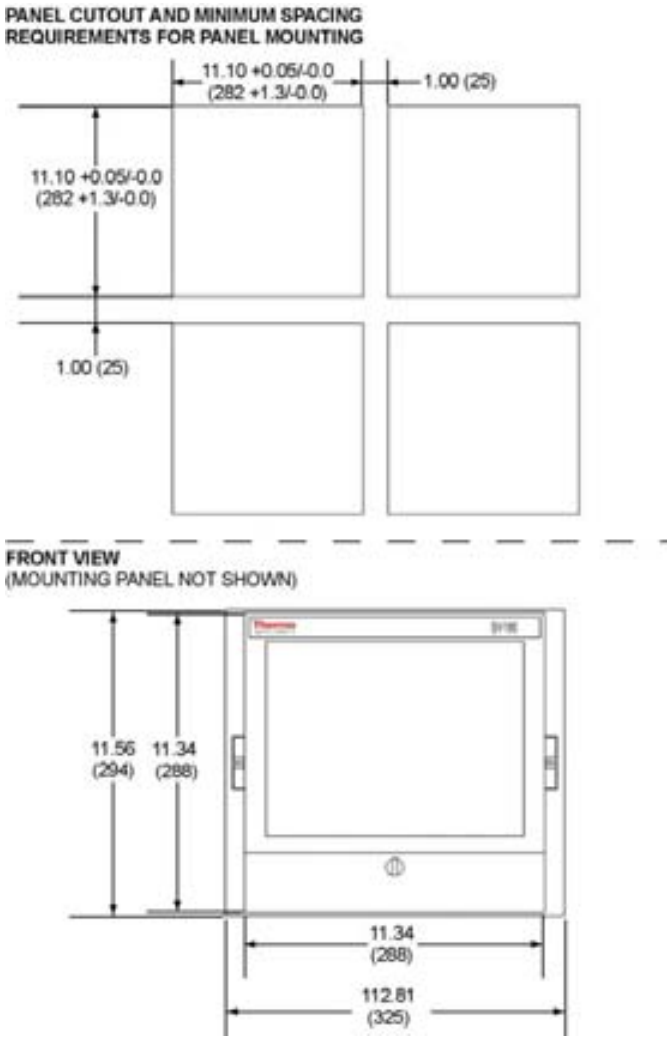


Figure 2–1. Installation dimensions (1 of 2)

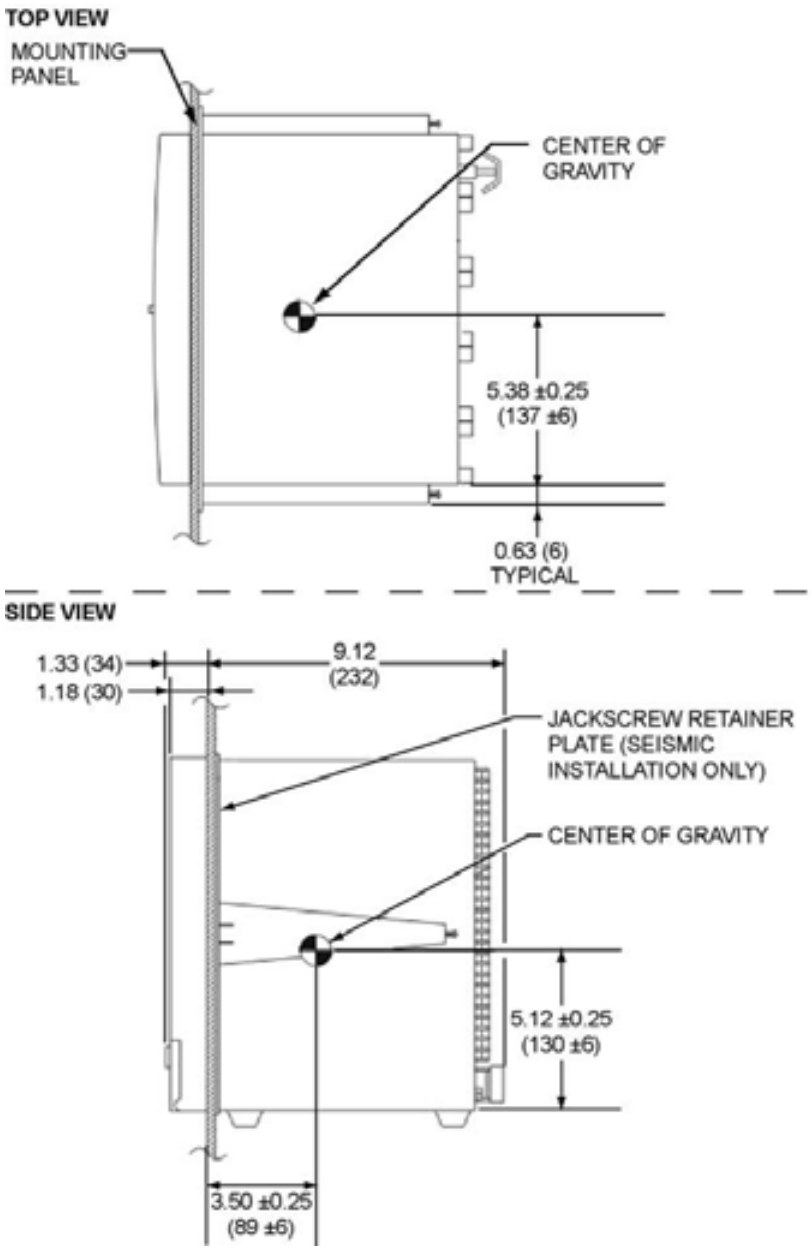


Figure 2–2. Installation dimensions (2 of 2)

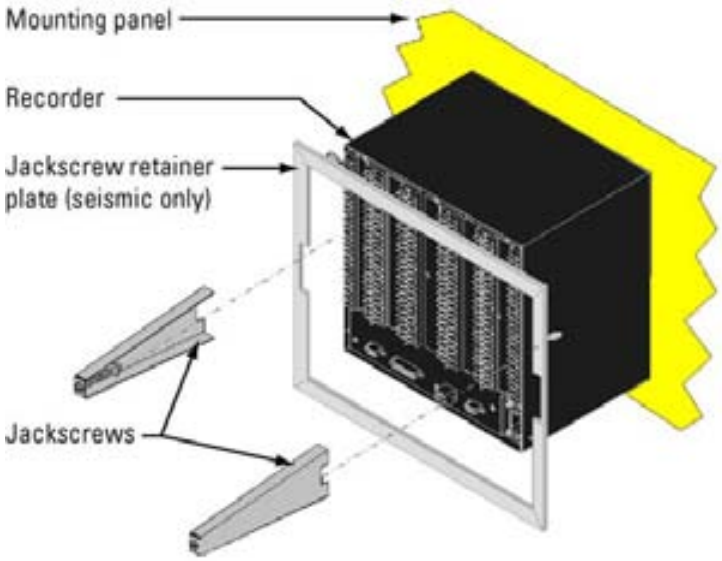


Figure 2–3. For seismic installations

Multiple Recorder Panel Mount

Several recorders can be mounted together in a single panel. Refer to installation drawings for the minimum spacing requirements for multiple recorders. Install the recorders according to steps 1–9 in the previous section.

Wiring Procedures

Power Requirements

The recorder operates on 115 Vac (100–120 Vac) or 230 Vac (200–240 Vac) in a 50/60 Hz environment, 90–125 Vdc, or 18–30 Vdc enabling it to be used in most countries. Thus, the power requirement you must be aware of is the correct mains frequency, 50 or 60 Hz, to maximize noise rejection.

Connecting the Power

All connections are made to the rear terminal panel. Any wiring carrying hazardous voltages must conform to all applicable local and national safety codes. Primary operating power connection is via the mains terminal block with lug type screws, spaced 0.375 inch (9.52 mm) apart.

Warning Power connections MUST be made in accordance with local standards or codes of practice. ▲

Warning Prevent the possibility of electrical shock or damage to the instrument: Disconnect power PRIOR TO making any connections. ▲

Warning This unit is provided with a power input terminal strip compatible with a 3-wire grounded cable with a plug. ALWAYS ensure the ground wire (green or green and yellow) is connected to a low impedance safety ground within the AC power distribution system. ALWAYS use an approved 3-wire cable to connect the unit to the main AC. ▲

115 Vac Operating Power Connections

Refer to Figures 2–4 and 2–5 if your unit is connected to 115 Vac, 50/60 Hz power. The wire color codes for USA and European communities are shown in the table that follows.

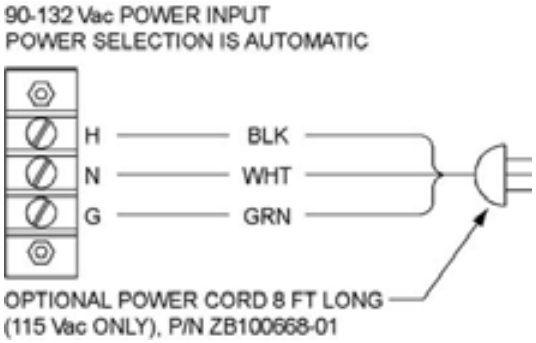


Figure 2–4.

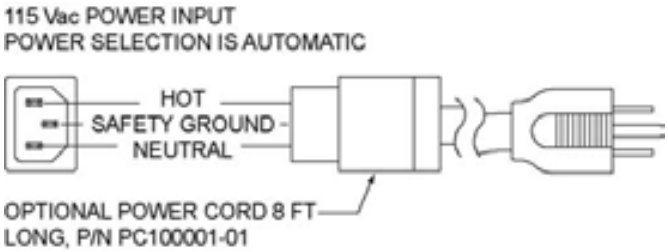


Figure 2–5.

Table 2–1.

Country	Ground*	Line (HOT)	Neutral (RET)
USA	Green	Black	White
EEC	Green/yellow	Brown	Blue

* ⏚

240 Vac Operating Power Connections

Refer to Figures 2–6 and 2–7 if your unit is connected to 230 Vac, 50/60 Hz power. The wire color codes for USA and European communities are shown in Table 2–1 in the previous section.

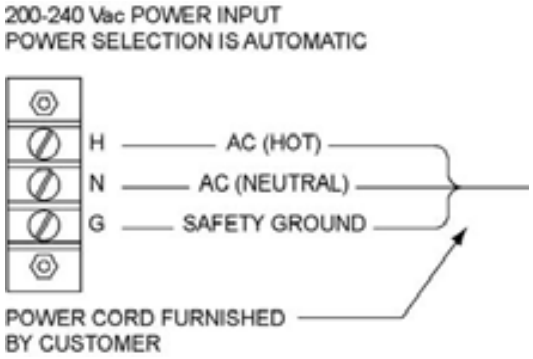


Figure 2–6.

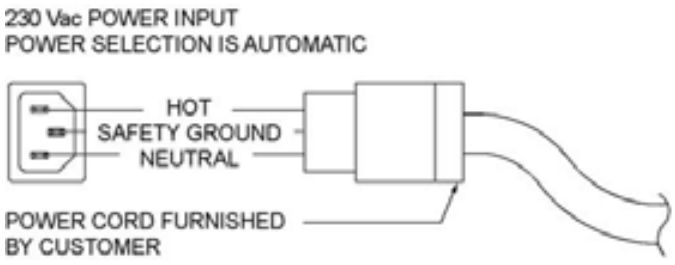


Figure 2–7.

DC Operating Power Connections

Two options are available for units connected to dc operating power 18–30 Vdc and 90–125 Vdc. Lug terminal connections (Figure 2–8) or standard PC power plug receptacle (Figure 2–9) are also available.

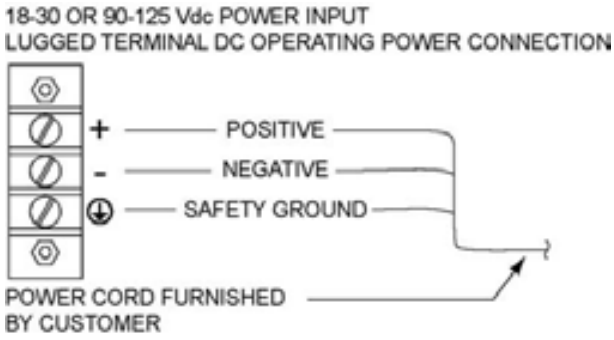


Figure 2–8.

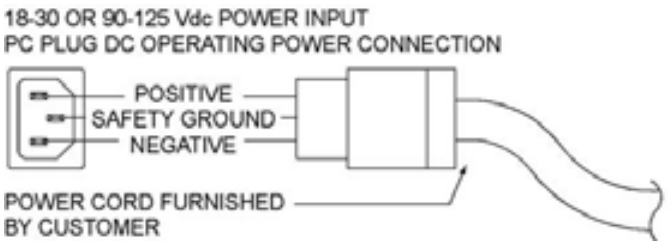


Figure 2–9.

Signal Input Wiring

Warning Prevent the possibility of electrical shock or damage to the instrument. Disconnect power PRIOR TO making any connections. Use extreme caution when wiring signal input connections. ▲

Warning Hazardous potentials may exist on signal input terminals which are floating, with respect to case ground. These hazardous potentials may be on the rear terminals panel of your instrument. Any voltage potential at the signal source will exist on the instrument's respective signal input terminal, for example; thermocouples used to monitor generator winding temperatures. ▲

Caution NEVER run signal and power or control wiring together in the same conduit. This will prevent possible recording errors due to induced signals between lines. Route signal wires away from power wires at the rear panel. ▲

Caution Ground cable shields at ONE END only to eliminate the possibility of interference due to ground loop currents. When grounded transducers are used, the shield should be grounded at the sensor end only. ▲

Depending on the options you ordered, the recorder can accept up to 80 direct inputs. Input connection is via screw terminal connectors on the rear panel. Inputs can be mixed in any combination of thermocouple, RTD (with the purchased option), milliamps (mA), millivolts (mV), volts (V), or contact inputs. We recommend that you record data on the Point Programming Forms (Appendix C) as you connect the inputs.

General Wiring Instructions

- Grounding: Signal cable shields or screens should be terminated at the device end of the wire. Do not terminate shields at both ends, as this will set up a current loop in the shield. Read the procedures before connecting inputs to the terminals.
- Wires: We recommend twisted and shielded 16 AWG wiring for all input signal wiring. Give wires 6–18 twists per foot of wire (18 is recommended). For accuracy, we recommend using equal length wires (equal resistance) for RTD wires. Use 14 Ga. wire for 10-ohm copper RTDs and any long distance runs. If 14 Ga. wire is to be directly terminated at the recorder, terminal lugs must be used (see Terminal Connectors below).
- Terminal Connectors: The screw terminal connectors are of the lug type and are spaced 0.375 inch (9.53 mm) apart. Therefore, it is necessary to terminate the wires with lugs.
- Required Tools: You will need a small screwdriver and a pair of wire cutters/strippers. We also recommended using shielded, twisted lead wire to minimize electromagnetically induced noise.

Thermocouple Inputs

Thermocouple input connections are made as shown in the view in Figure 2–10.

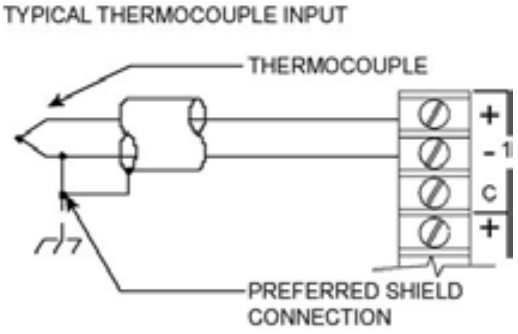


Figure 2–10.

RTD Inputs

For long lead runs or 10-ohm copper RTDs, use 14 AWG wire with terminal connectors. Refer to Figure 2–11 for connection information and to the RTD manufacturer specifications to determine color code connection information.

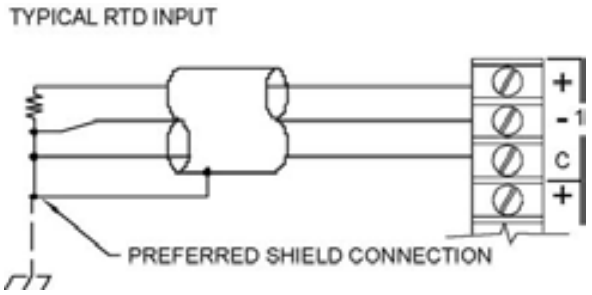


Figure 2–11.

Linear Voltage Inputs

Linear voltage inputs consist of variable voltage input ranges (±50, ±100, ±200 mV, ±1, ±5, ±10 V). Connect voltage inputs as shown in Figure 2–12. Signal inputs greater than 10 V require the use of an input voltage divider (consult your local representative or the factory).

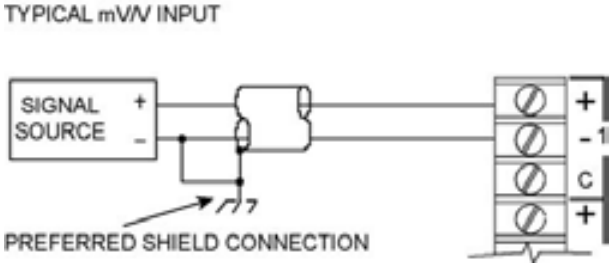


Figure 2–12.

Linear Current Inputs

Linear current inputs consist of current inputs of 4–20 mA or 10–50 mA. Connect current inputs as shown in Figure 2–13. Current inputs require that the 50-ohm shunt resistor be placed across the terminals.

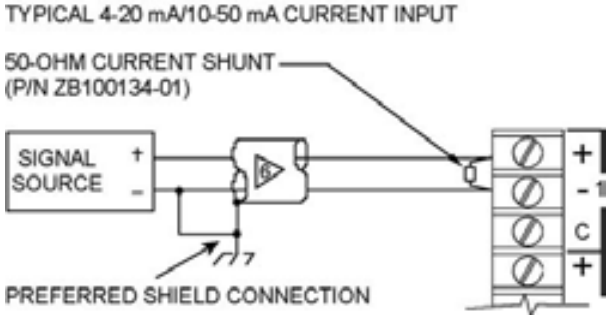


Figure 2–13.

Dry Contact Inputs

Dry contact inputs consist of a switch with no voltage or current applied. Switch condition is indicated as either open or close. Connections for are shown in Figure 2–14.

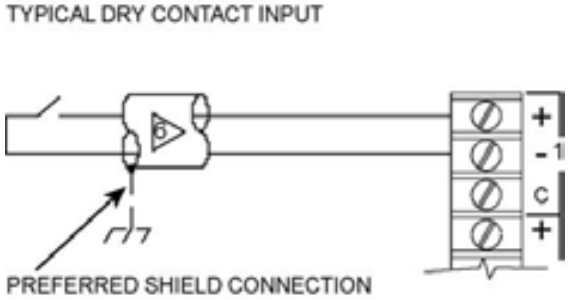


Figure 2–14.

Two-Wire Transmitter Power Supply

The optional two-wire transmitter power supply option provides an isolated 24-V dc current with a maximum output of 2 A. Refer to Figures 2–15 and 2–16 for connection details. Two-wire transmitter inputs must have a 50-ohm shunt resistor connected across the terminals.

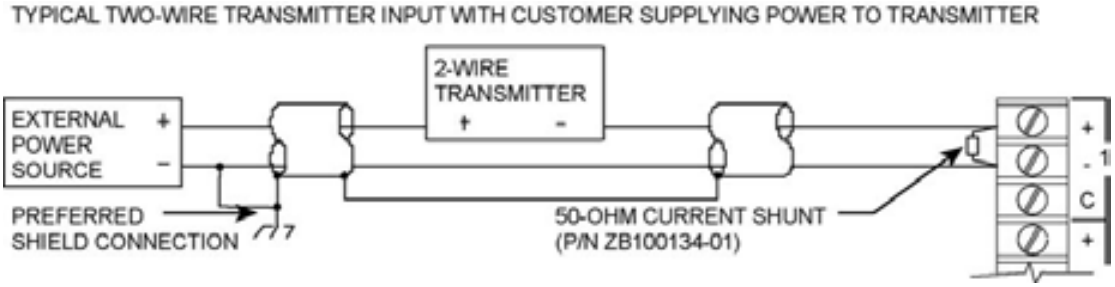


Figure 2–15.

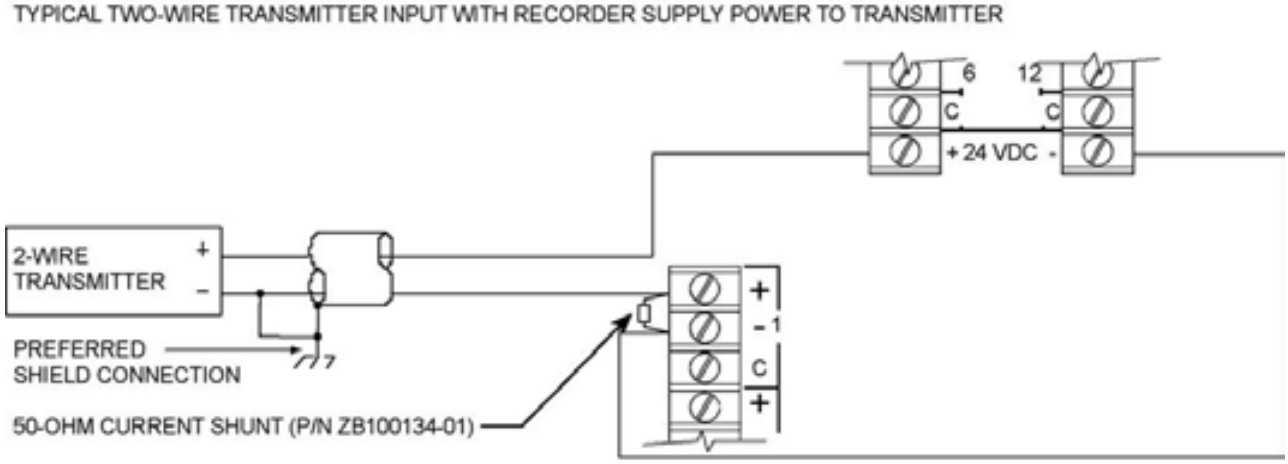


Figure 2–16.

Alarm Contact Output Connections

The recorder may be equipped with up to five optional digital input/output boards, each having 16 alarm relay contacts. The contact ratings are:

- 1 A at 117 Vac or 26 Vdc resistive load
- 0.5 A at 230 Vac resistive load
- 0.4 A at 250 Vdc resistive load

The relays may be configured as normally de-energized or normally energized (fail-safe). Alarm contacts may be configured as normally open (NO) or normally closed (NC). Configure the relays by performing the following steps and referring to Figure 2–17.

1. Remove power from the unit.

2. Open the recorder front door, and remove the GPIO board from the chassis by actuating the card release and pulling it straight out.

3. Configure the jumpers by pulling the jumper straight off of the pins and pushing it straight onto the desired pins.

4. When you have finished configuring the relays, reinstall the GPIO board into the recorder chassis, and close the recorder front door.

Figure 2–18 shows connection detail for the alarm contacts.

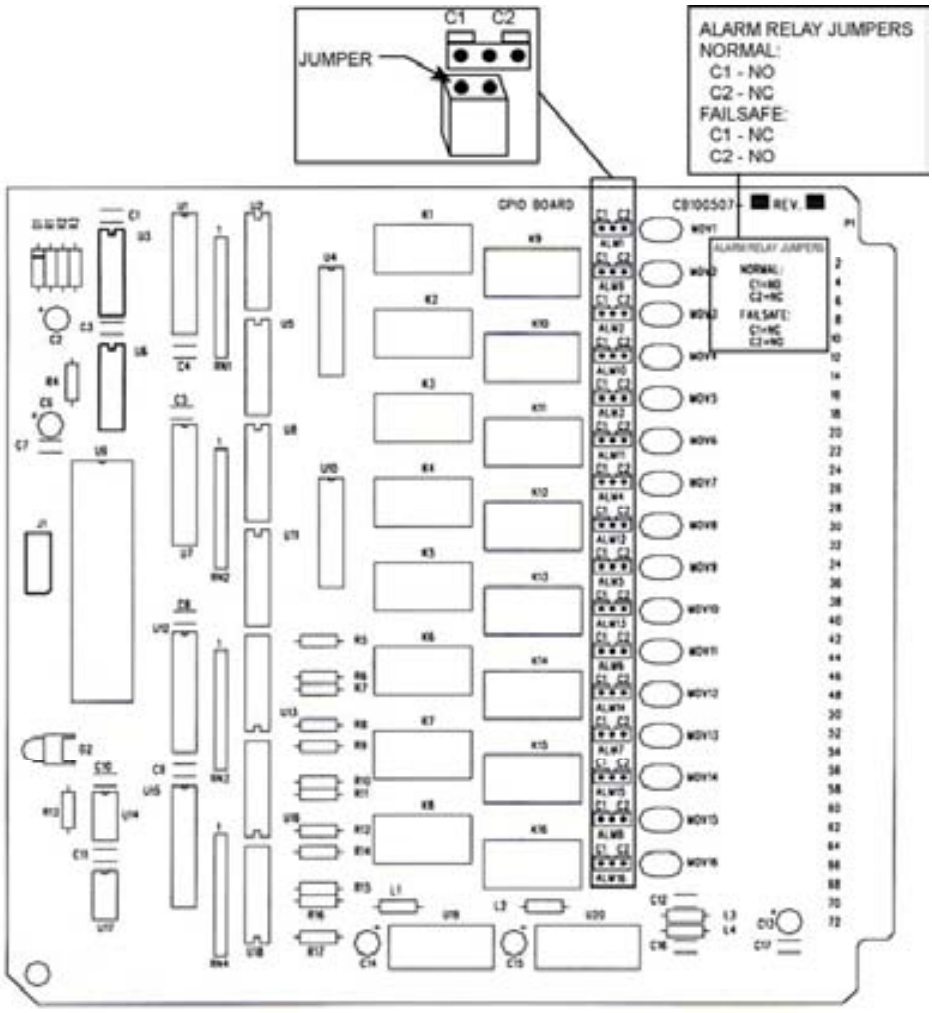


Figure 2–17.

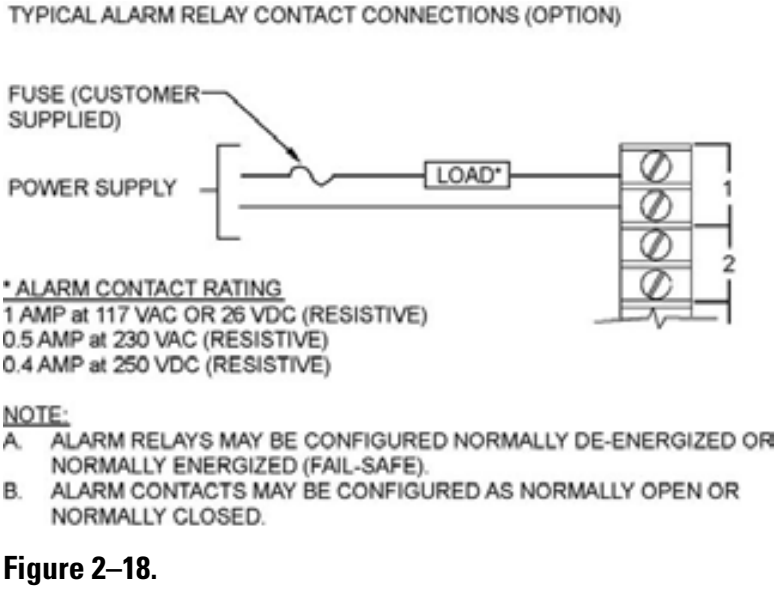

TYPICAL ALARM RELAY CONTACT CONNECTIONS (OPTION)
FUSE (CUSTOMER SUPPLIED)
POWER SUPPLY
LOAD*
1
2
* ALARM CONTACT RATING
1 AMP at 117 VAC OR 26 VDC (RESISTIVE)
0.5 AMP at 230 VAC (RESISTIVE)
0.4 AMP at 250 VDC (RESISTIVE)
NOTE:
A. ALARM RELAYS MAY BE CONFIGURED NORMALLY DE-ENERGIZED OR NORMALLY ENERGIZED (FAIL-SAFE).
B. ALARM CONTACTS MAY BE CONFIGURED AS NORMALLY OPEN OR NORMALLY CLOSED.

Figure 2–18.

Event Marker Inputs

Six event marker inputs are available with each optional GPIO board. Event marker inputs must be dry contact/switch inputs. Connect event marker inputs as shown in Figure 2–19.

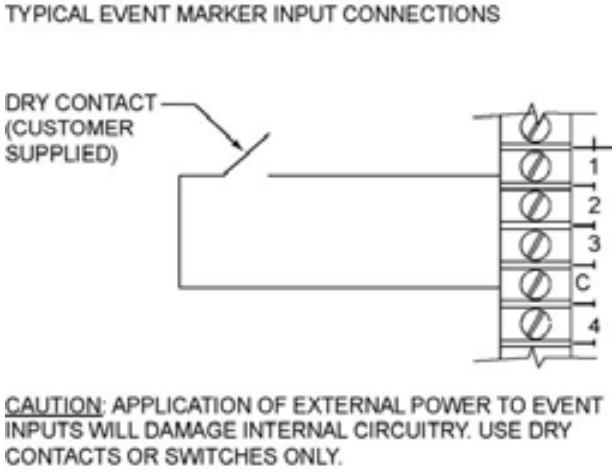

TYPICAL EVENT MARKER INPUT CONNECTIONS
DRY CONTACT (CUSTOMER SUPPLIED)
1
2
3
C
4
CAUTION: APPLICATION OF EXTERNAL POWER TO EVENT INPUTS WILL DAMAGE INTERNAL CIRCUITRY. USE DRY CONTACTS OR SWITCHES ONLY.

Figure 2–19.

System Alarm Contact Connections

The system alarm contact is configured as a fail-safe contact. The rating for the system alarm contacts 100 mA maximum resistive load at 230 Vac/250 Vdc maximum. System alarm connections are shown in Figure 2–20.

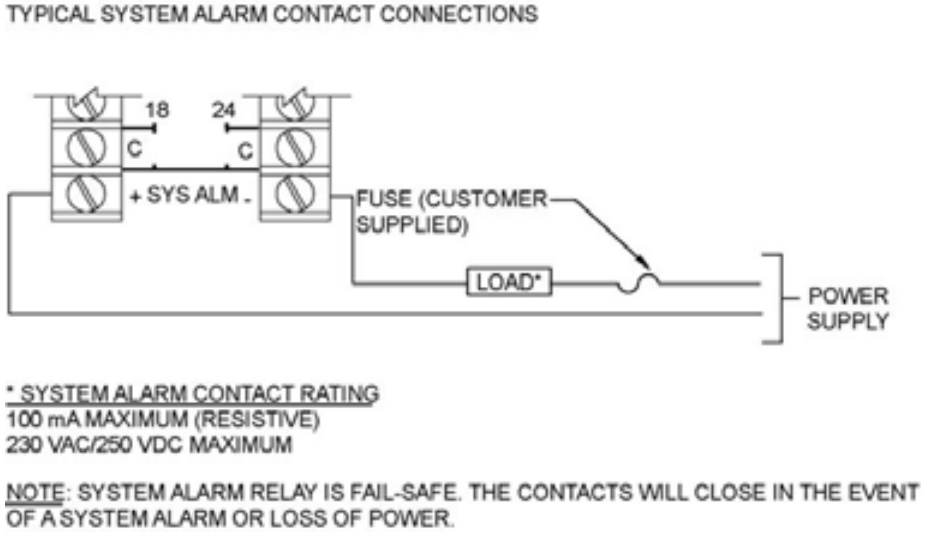
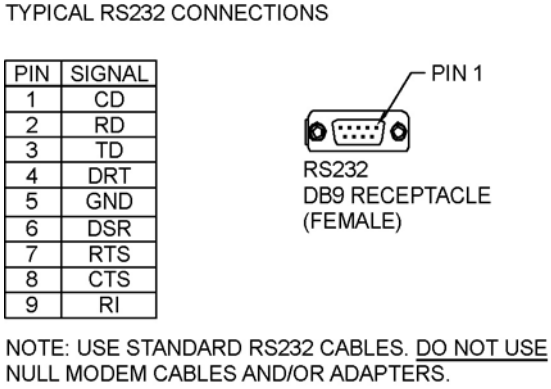

TYPICAL SYSTEM ALARM CONTACT CONNECTIONS
18
24
C
C
+ SYS ALM -
FUSE (CUSTOMER SUPPLIED)
LOAD*
POWER SUPPLY
* SYSTEM ALARM CONTACT RATING
100 mA MAXIMUM (RESISTIVE)
230 VAC/250 VDC MAXIMUM
NOTE: SYSTEM ALARM RELAY IS FAIL-SAFE. THE CONTACTS WILL CLOSE IN THE EVENT OF A SYSTEM ALARM OR LOSS OF POWER.

Figure 2–20.

Serial Communication Port Connections

The recorder is equipped with one RS232 and one RS485 serial communication port. The RS232 connection requires a standard DB9 male connector and cable. RS232 connections can support cable runs of up to 50 feet (16 m). The RS232 connections are shown in Figure 2–21.



PIN	SIGNAL
1	CD
2	RD
3	TD
4	DRT
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Figure 2–21.

The RS485 connection is via two-wire (twisted pair) cable and can support cable runs up to 4000 feet (1300 m). Up to 31 recorders and/or other RS485 compatible devices may be connected to the line. The type of cable used limits the data rate and distance. For this unit, 24 AWG polyethylene twisted telephone cable with a shunt capacitance of 16 ρF/ft. (52 ρF/m) allows the full distance of 4000 feet (1300 m). RS485 connections are shown in Figures 2–22 and 2–23.

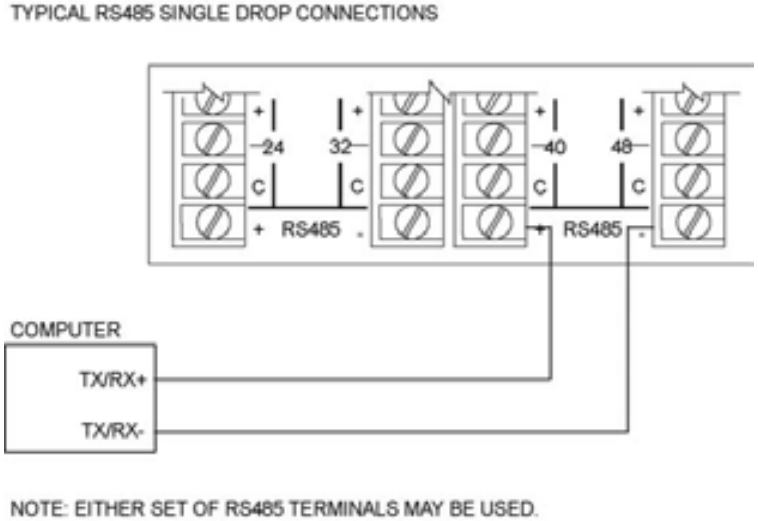


Figure 2–22.

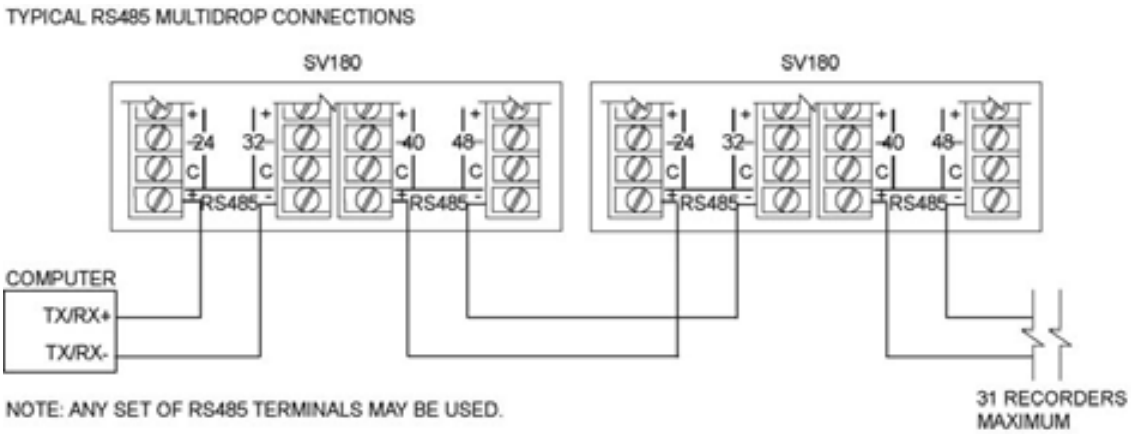


Figure 2–23.

Ethernet Port Connections

The 10/100 Base-T Ethernet port uses a standard RJ45 connector. Wiring connections for the RJ45 connector are shown in Figure 2–24.

ETHERNET PORT CONNECTIONS
(10/100 BASE-T)

PIN	SIGNAL
1	TX+
2	TX-
3	RX+
6	RX-

RJ45 CONNECTOR

Figure 2–24.

Parallel Printer Port Connections

The parallel printer port connector requires an industry standard DB25 male connector. The wiring for the port is shown in Figure 2–25.

PARALLEL PORT CONNECTIONS

PIN	SIGNAL	PIN	SIGNAL
1	STROBE	14	AUTO FEED
2	D0	15	ERROR
3	D1	16	INIT
4	D2	17	SELECT IN
5	D3	18	GND
6	D4	19	GND
7	D5	20	GND
8	D6	21	GND
9	D7	22	GND
10	ACK	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SELECT		

PRINTER
DB25 RECEPTACLE
(FEMALE)

Figure 2–25.

External Video Monitor Connections

The external video connection uses an industry standard 15-pin VGA plug. Connection information is shown in Figure 2–26.

TYPICAL VIDEO MONITOR PORT WIRING

PIN	SIGNAL
1	RED
2	GREEN
3	BLUE
4	NOT USED
5	NOT USED
6	RED RETURN
7	GREEN RETURN
8	BLUE RETURN
9	NOT USED
10	VGA GND
11	NOT USED
12	NOT USED
13	HORIZ. SYNC.
14	VERT. SYNC.
15	NOT USED

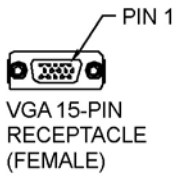


Figure 2–26.

ADC Calibration Connections

At some point, it becomes necessary to calibrate each ADC card in the unit. The ADC calibration connection point allows easy access for calibrating all installed ADC cards simultaneously. Refer to Figure 2–27 for standard instruments. Refer to Figures 2–28 and 2–29 for multibank instruments.

ADC CALIBRATION CONNECTIONS FOR STANDARD UNITS

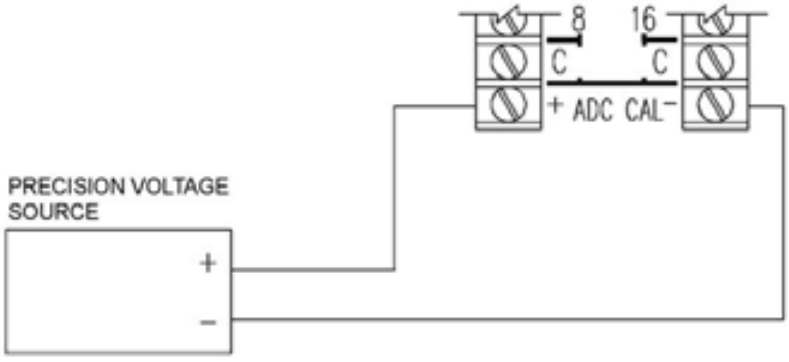


Figure 2–27.

If the instrument contains only ADC boards in slots 1–5 for measurements, connect the precision voltage source to the ADC Cal+ and ADC Cal- inputs located at the bottom left of the rear terminal panel (RTP).

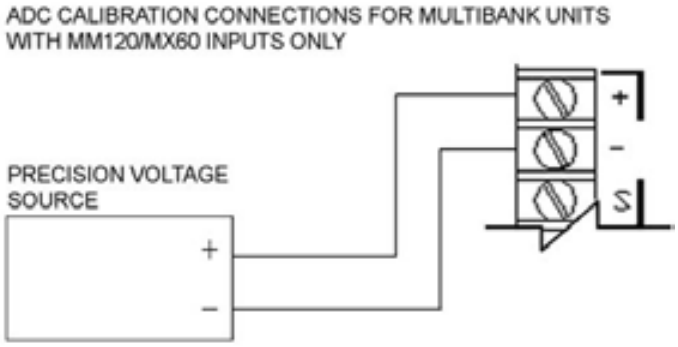


Figure 2–28.

If the instrument contains an ADCMCU board in slot 1 for measurements, connect the precision voltage source to the Remote Interface+ and Remote Interface- inputs located at the top left of the RTP.

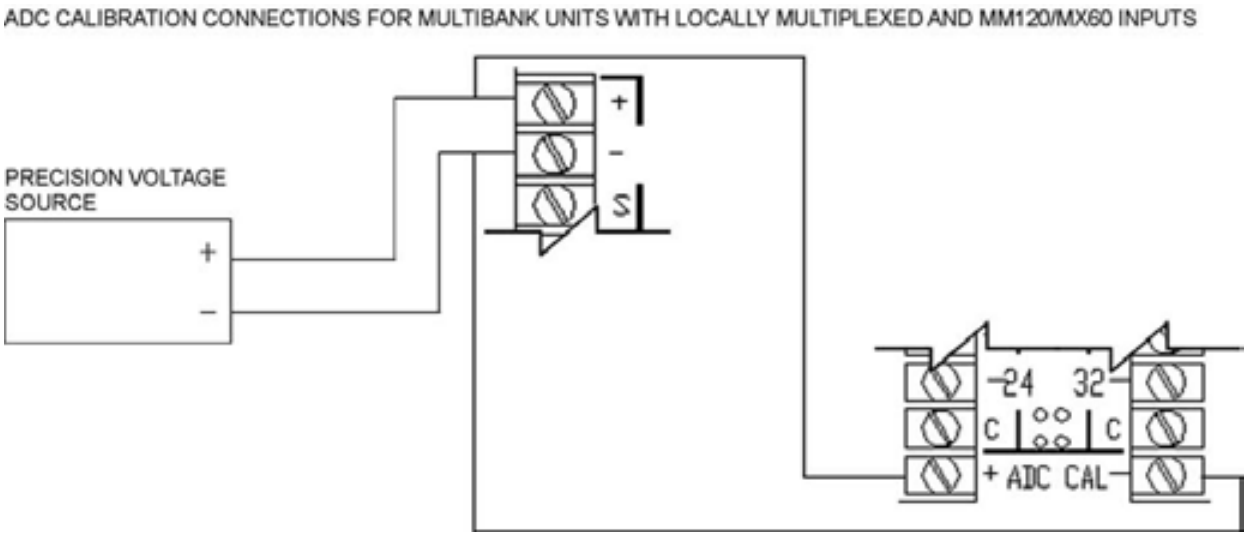


Figure 2–29.

If the instrument contains an ADCMCU in slot 1 and additional ADC boards in slots 2–5 for measurements, connect the precision voltage source simultaneously to ADC Cal+/Remote Interface+ and ADC Cal-/Remote Interface-.

Multibank Recorder to Multiplexer

Connections from a multibank recorder to a multiplexer are either hard wired or made using a 25-pin D connector. Refer to the following and to the appropriate multiplexer manual (MM120, P/N MO100085-01 or MX60, P/N MO100125-01).

Note A cable with spade lugs on one end and a 25-pin D connector on the other (P/N HN101039-01) is also available. ▲

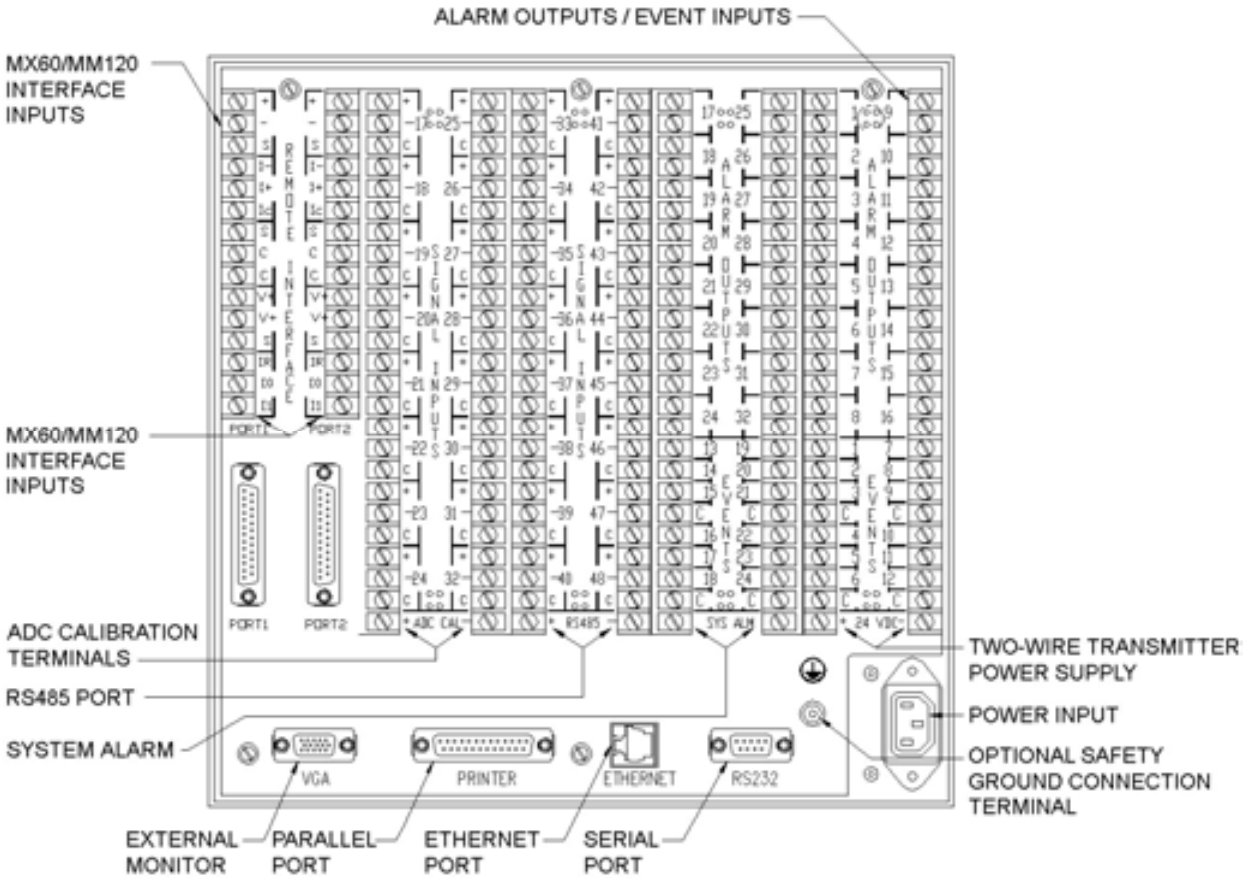


Figure 2–30. Multibank recorder rear terminal panel

Hard Wiring

The cable for hard wiring a multibank recorder to multiplexer comes equipped with spade lugs attached to both ends (P/N HN101038-01).

Caution When making connections, shields should be permanently isolated from each other to prevent damage to the recorder. ▲

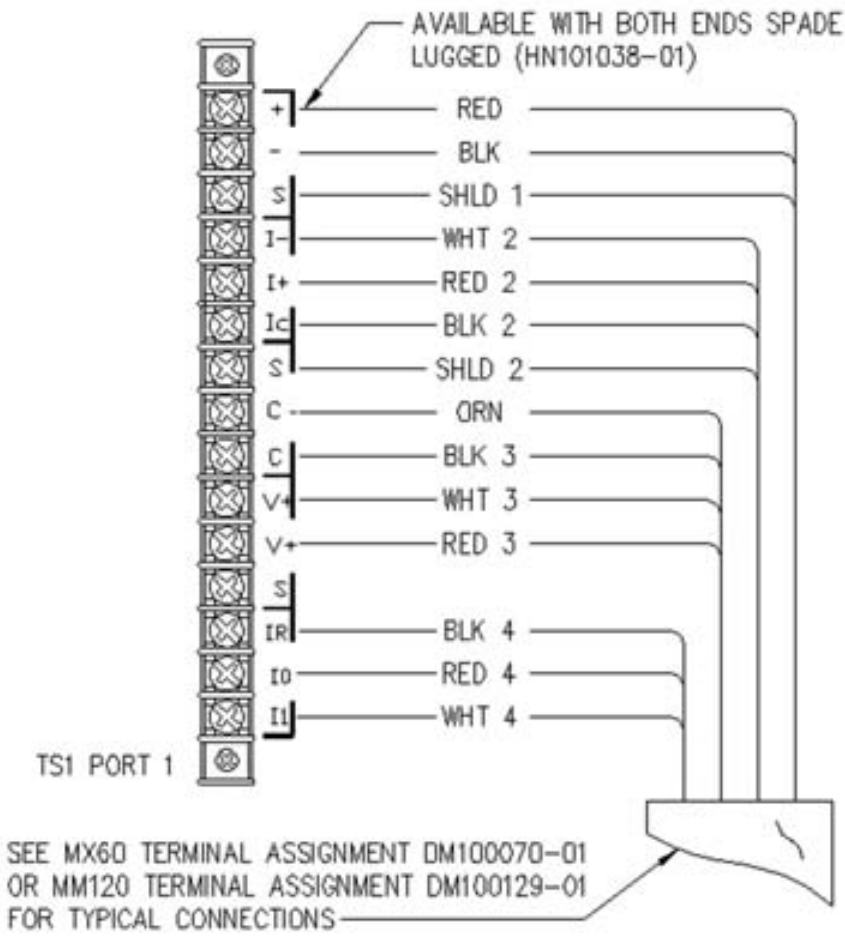


Figure 2–31.

25-Pin D Connectors

Connections can also be made using a 25-pin D connector (P/N HN101070-01) on both ends.

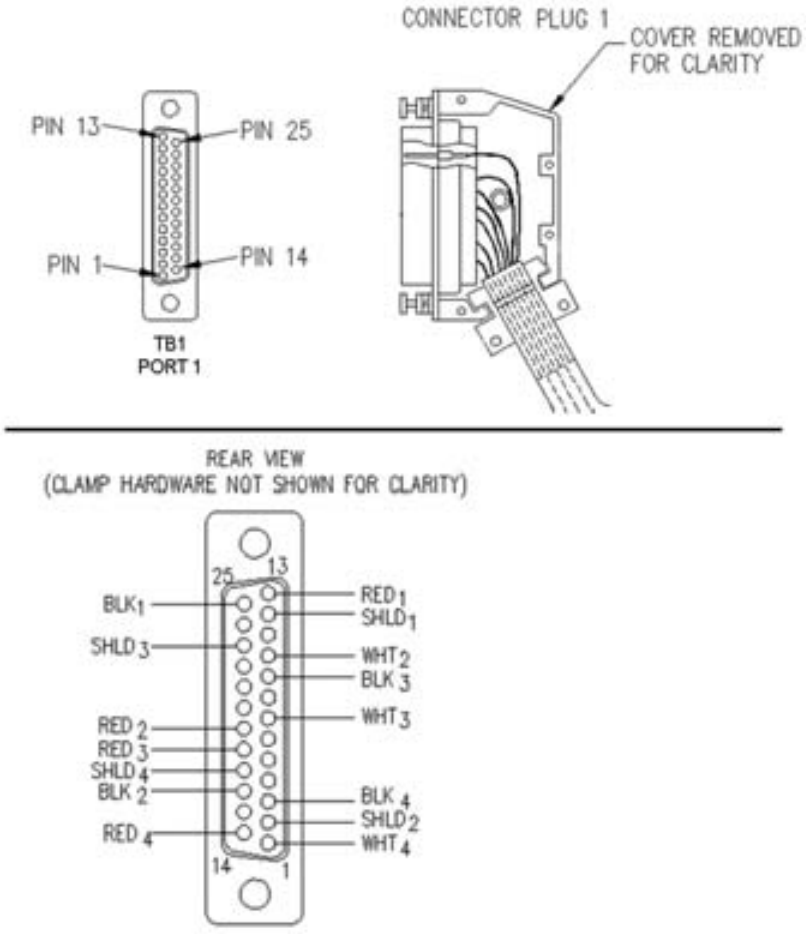


Figure 2–32.

Chapter 3
Operating the Instrument

Operator Controls

Open the media door on the recorder to access several operator controls. These controls are shown in Figure 3–1 and described in the table below.

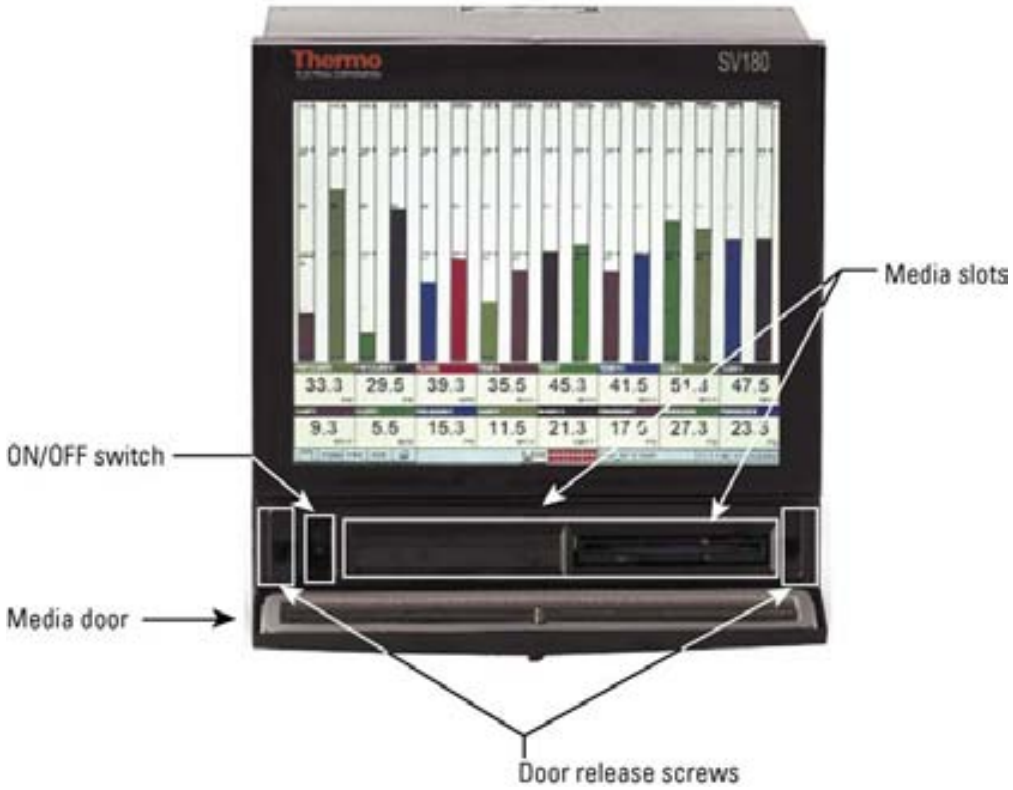


Figure 3–1.

Table 3–1.

Control	Description
ON/OFF switch	Located inside the recorder.
Media slot(s)	Allows you to insert/remove the media. Media slot size depends upon type of media the recorder accepts (floppy disk and/or PC card). Media can only be removed via the media release. Release buttons are different for each media type but are located in same general area. Press to eject the media.

Control	Description
Media door	Allows access to the media slot(s). To open the media door, twist the access knob and pull on the door.
Door release screws	Hold the door firmly to the case. Turn the screws counterclockwise, grasp the bezel on each side, and lift up. Pull the door straight out until it stops. Then open the door from the left side.

The recorder door opens 90 degrees and no further. Do not force the door open more than 90 degrees or damage to the recorder may result.

Graphical Interface

The recorder has an LCD graphics screen that also acts as a touch keypad. Lightly press the desired area of screen to activate the function, and the unit acknowledges the press by providing audible feedback. Refer to Figure 3–2, and you can see that the graphics screen is divided into two sections: the button bar along the bottom of the screen and the graphics area. Note that it is necessary to view the screen head-on to avoid parallax error when trying to press buttons which are close together.

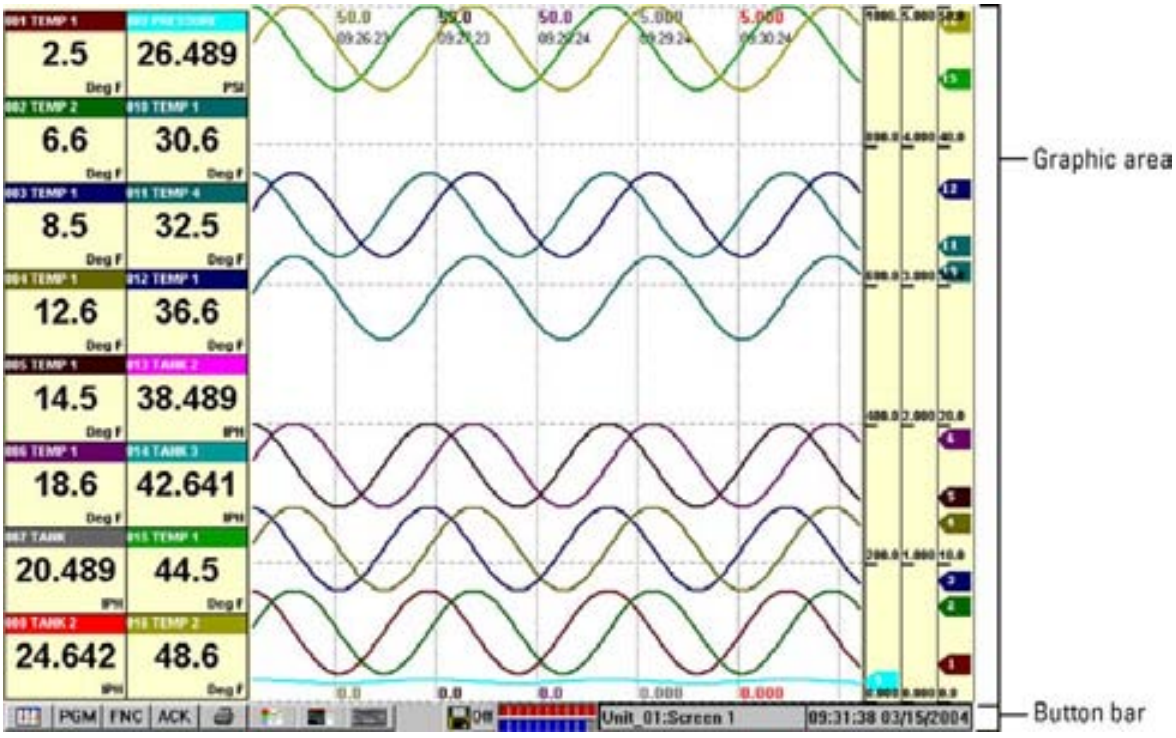


Figure 3–2.

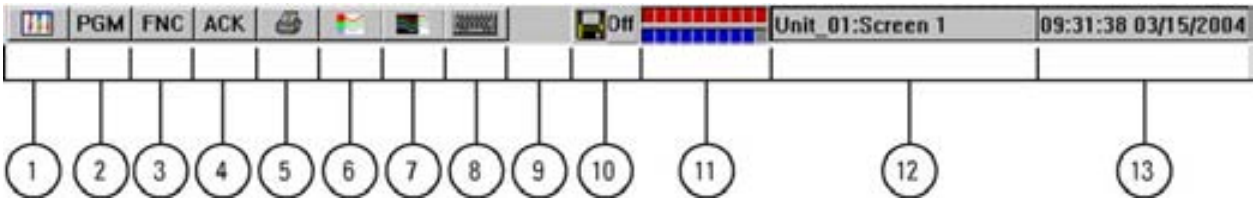


Figure 3–3.

The following table provides descriptions of button functions.

Table 3–2.

Button #	Function
1	Screen button: Displays screen selection menu bar, allows you to select specific screen.
2	Program menu (PGM) button: Opens the Program menu.
3	Function menu (FNC) button: Opens the Function menu.
4	Acknowledge (ACK) button: Press to acknowledge alarm condition; button changes to a solid red color. Also resets any output relays if option is installed and programmed.
5	Print button: Transfers the current screen to the printer port (available on all screens but in varying locations).
6	Show button: Used to turn on and off the digital data display on the currently displayed trend screen.
7	Review button: Only displayed on the horizontal and vertical trend screens.
8	Annotation button: Displays keyboard, allowing you to make annotations on the chart as the recorder gathers data. Only shown on trend screens.
9	Media Review button: If activated, displays media review icon.
10	History button: Displays whether history is on or off.
11	Disk Full Progress bars: Represents the percentage of media full for both the primary and secondary drives.
12	Current Display block: Shows the following information about the displayed screen: (a) Unit ID is first item shown in this block and (b) Screen Title is shown next and may be up to 8 characters long.
13	Time and Date

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Chapter 4
The Program Menu

General

This section addresses each Program menu selection, except for Points, Screens, and Ports. Due to the detail involved in each, these selections are addressed in separate chapters.

You can access the Program menu by pressing **PGM** on the button bar.

Figure 4–1. The Program menu

Date & Time

Figure 4–2.

1. Select a date format: American (mm/dd/yyyy) or European (dd/mm/yyyy).

2. Press the **Date** input box, and enter the date.

3. Press the **Time** input box, and enter the time in hh:mm:ss format.

4. If you wish the time-of-day clock to automatically adjust for Daylight Savings Time, touch the associated check box.

5. Press **Close** when complete.

Points

Refer to Chapter 5.

Point Groups

Points must be assigned to groups in order for them to be displayed or logged. This menu item allows you to set up groups of points for this reason. A maximum of 32 groups may be assigned, and any or all points may be assigned to any or all groups. Assigning points to groups allows you to arrange points so that only those that you want to see are shown on a screen.

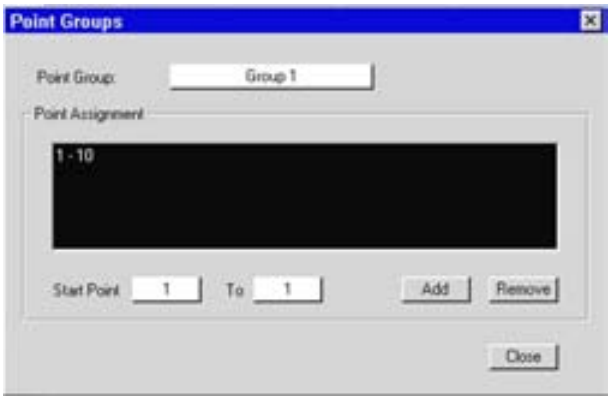

Figure 4–3.

1. Press the **Point Group** input box. You can assign a unique name to each group by pressing the **Group Name** input box and entering the name. Press **Accept**.

2. Press **OK**. The points assigned to the selected group appear in the Point Assignment box. You can add points to or remove points from the group by pressing the **Start Point** input box and entering the point (or the first point of the range of points you want to add/remove). Press **OK**.

3. If you only want to add/remove one point, press **Add** or **Remove**. If you want to add/remove a range of points, press the **To** input box. Type in the ending point number for the series of points. Press **OK**. Press **Add** or **Remove**, and the Point Assignment box reflects the change made to the point group. For example, Figure 4–4 shows how the Point Assignment box is updated after removing points 4 through 6 from the selected group.

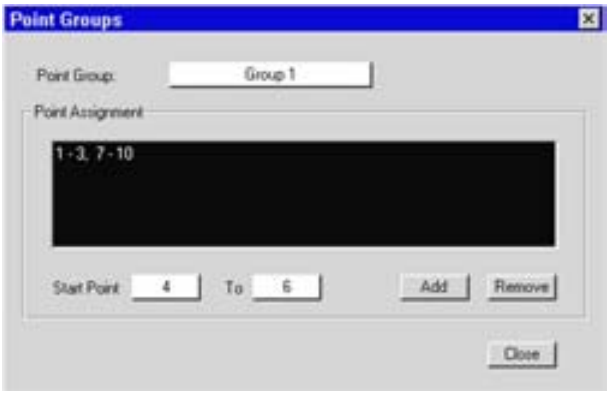

Figure 4–4.

4. Press **Close**.

Screens

Screens are discussed in detail in Chapter 6.

History

Enabling the history function causes the recorder to internally buffer historical data. If you are going to use a Flash card to store data, refer to the following for a list of recommended cards:

Table 4–1.

Card Size	Thermo Fisher P/N
64 MB	PA100259-02
128 MB	PA100259-03
256 MB	PA100259-05
512 MB	PA100259-06
1 GB	PA100259-07

Flash cards require a compact flash to PCMCIA adapter (Thermo Fisher P/N PA100260-01)

Figure 4–5.

1. Memory Storage Block:

   a. Determine which point group you want the recorder to maintain history on, and press the **Point Group** input box. Press the desired point group on the following screen, and press **Accept**.

   b. The Sample Rate field allows you to enter the frequency in seconds which the recorder stores history from the designated point group. The recorder can be programmed to store history to internal RAM at a user-selectable interval from 1 to 250 seconds.

2. Media Storage Block:

   To set up either the History A or the History B section:

   a. Press the **Point Group** input box within that section of the block. Press the desired point group on the following screen, and press **Accept**.

   b. Determine whether you want the history stored on the primary or secondary media, and select it.

   c. The recorder can store data as the actual Value, as the Average of all readings from one history sample to the next, as the minimum (Min) value, or the maximum (Max) value. Press the desired format.

3. Media Storage, Trigger

   There are 3 ways to trigger the recorder to store history: at a set interval, when an alarm activates, or when a switch opens. Refer to the following for instructions on how to set up each trigger type.

   a. Common fields

      Sync Time: Allows you to synchronize the times that actual sample data are stored.

      Normal Rate: Specify the frequency which the recorder stores data from all points within the designated point group.

      Alarm Rate: Specify the frequency which the recorder stores data from points when they go into alarm.

b. Interval Trigger

Entering 00:15:00 as the Sync Time, 00:15:00 as the Normal Rate, and 00:05:00 as the Alarm Rate results in the recorder beginning to take samples at 15 minutes after the hour (Sync Time) in intervals of 15 minutes (Normal Time) and to record data from points in alarm for 5 minutes (Alarm Rate).

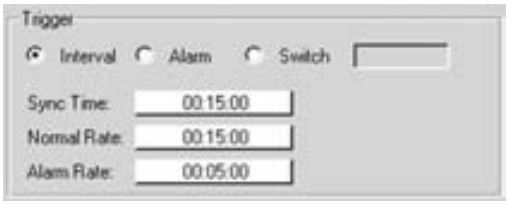

Figure 4–6.

c. Alarm Trigger: Selecting the Alarm trigger type opens the Stop Mode section. In Figure 4–7, the recorder collects data until the alarm clears. In Figure 4–8, the recorder collects 20 samples from points in alarm.

Figure 4–7.

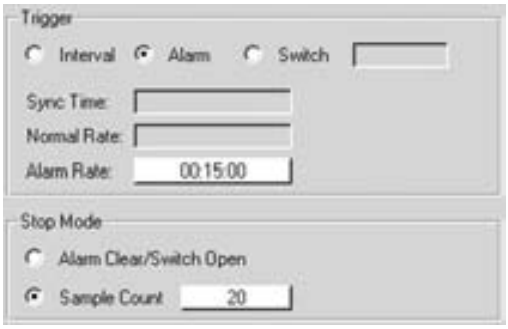

Figure 4–8.

d. Switch Trigger: If you select the Switch trigger type, press the input box. Enter the switch you want to designate and press **OK**. Selecting the Switch trigger type also opens the Stop Mode section. Refer to Figure 4–9. In this figure, the recorder collects data until switch 1 opens. In Figure 4–10, switch 1 remains closed, and the recorder collects history until 20 samples are collected from the designated point group.

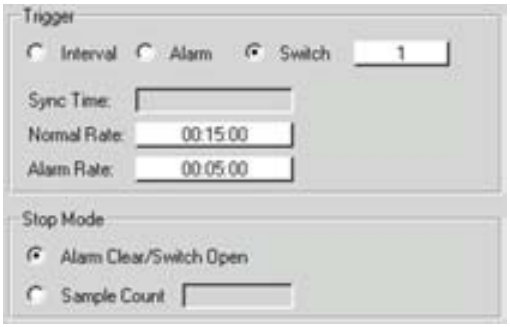

Figure 4–9.

Figure 4–10.

4. Press the **History On** check box to turn the history function on.

5. If memory storage is configured, the operator can only view the recorder's review memory. If Media Review is enabled, both the media and the recorder's review memory are available for review. Notice in Figure 4–11 that the Memory Review button is available with the Media Review enabled or disabled.

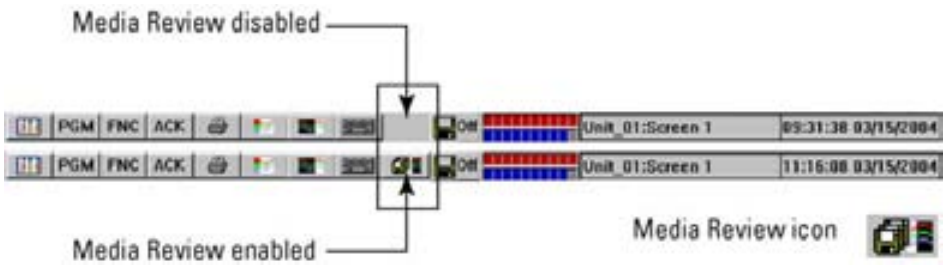

Figure 4–11.

Ports

Refer to Chapter 7.

Measurement

Figure 4–12.

1. Mode: Set up the recorder to accept live process input signals or to simulate signals for demonstration or training purposes. Press the button associated with the desired mode of operation.

2. Rejection: This selection sets the line power input noise rejection and should be set at your line power frequency. Typically, 60 Hz is set for North America and 50 Hz for Europe. Press the button associated with the required frequency.

Note If Rejection is changed, an ADC calibration is required. ▲

3. TCBO Checks: Select to enable burnout detection and annunciation for thermocouple type inputs.

4. Span & Offset: When enabled, this function allows for correction of known inaccuracies in thermocouples and RTDs. Select by pressing the check box. Use the following formula to calculate span and offset:

   ```
   Point Data = (Measured Temperature x Span) + Offset
   ```

5. Factory: Used by Thermo Fisher to perform a factory calibration. A factory passcode is required.

6. ADC Calibration: Refer to the calibration section (Chapter 8).

Digital I/O

Figure 4–13.

This menu item allows you to define the operation of input switches and output contacts.

1. Input Switches Block:

   a. Switch Number: Press the text box and enter the switch number you want to set up. Press **OK**.

   b. Switch Function: Each switch contact can be set up to actuate a recorder function. Press the button associated with the function you want to assign to the switch. Following are descriptions of each switch function.

Table 4–2.

Switch	Function
None	No function assigned.
Event	Change in switch state signals an event, switch action = SPST.
ACK Alarm	Change in switch state acknowledges alarms, switch action = momentary.
Chart Speed	Change in switch state changes the chart speed, switch action = SPST.
Alarm Checks	Change in switch state changes the state of alarm checks, switch action = SPST.
Recording	Change in switch state changes the recording state from on to off or off to on, switch action = SPST.
Freeze Unit	Causes all programmed trend displays to stop updating; useful when necessary to temporarily pause a training session in progress, switch action = SPST.
Clear Unit	Erases all trend type displays and clears history review memory; useful when starting a training session, as the recorder begins collecting fresh simulated data, switch action = momentary.
Screen Blank	Causes the recorder display to be set at lowest possible intensity; useful during training sessions when there are long periods of inactivity, switch action = SPST.
Screen Advance	Select a switch number to assign to this function, and wire a momentary switch to it. When you return to the main screen and press the external switch, the recorder advances to the following screen. You can skip a screen by entering an "at" (@) sign before the screen name.
Screen Capture	Select a switch number to assign to this function, and wire a momentary switch to it. Each time you press the external switch, a bitmap file of the screen image is saved to the media designated as the config file media (set in the Media Control menu). The file name is the exact time (HH:MM:SS) that you pressed the button.

c. Open and Close Messages: Assign messages to print on the trend screen(s) chart when an event switch input changes state. Press the associated text box and enter the message. Press **OK**.

2. Output Contacts Block:

   a. Standard Alarms: Four standard alarms are available for assignment to output contacts. These selections define how the standard alarm contact outputs behave under certain conditions. Select the alarm by pressing the check box next to the associated alarm.

Table 4–3.

Standard Alarm	Description
Open on Alarm Clear	Contacts open when the alarm is cleared.
Open on Acknowledge	Contacts open when the alarm is acknowledged.
Failsafe Contacts	If fail-safe mode is not selected, alarm contact output relays are normally de-energized and will be energized when an alarm assigned to the contact occurs. Alternatively, if fail-safe mode is selected, the alarm contact output relays are normally energized and will be de-energized when an alarm assigned to the contact occurs.
Reflash Contacts	If reflash is not selected, alarm contact output relays will energize/de-energize based on any alarm(s) assigned to the contact changing state. Alternatively, if reflash is selected, alarm contact output relays will momentarily de-energize (approximately 100 msec.), then re-energize each time any alarm assigned to the contact changes state.

b. Common Alarm: One common alarm can be linked to the following items.

Table 4–4.

Common Alarm Contact	Description
Media Status	A “fill” percent is set to trigger an alarm when the media reaches set level.
Unit Fault	Any fault in the unit triggers this alarm (future option). The Unit Fault selection is not available in this release. Unit fault conditions may be addressed and annunciated by a number of enhanced discrete recorder setup options. Consult the factory for details related to these options.
Point Alarms	Can be linked to point alarms so that any point that goes into alarm also triggers the common alarm. Additional options for point alarms are: Open on Alarm Clear: Common alarm clears when the point alarm clears. Open on Acknowledge: Common alarm clears when the point alarm is acknowledged.

3. Press **Close.**

Display Control

Figure 4–14.

1. Display Intensity Block:
   a. Normal: Press the **High**, **Medium**, or **Low** button to select the level of intensity on the normal display. You can also set a custom level of intensity by pressing the Custom text box and entering the intensity level (1–100). Press **OK**.
   b. Screen Saver: Press the **High**, **Medium**, or **Low** button to select the level of intensity on the screen saver display. Alternatively, you can set a custom intensity level. Press **OK**.
   c. Wait: Set the time the recorder waits before activating the screen saver by pressing the input box and entering the time in seconds. The wait time must be over five seconds.

2. Digital Display Block:
   a. Alarm Blink: Press this check box if you want point digital display boxes to blink (for operator notification) if alarm states are active on the points.
   b. Display Point Number: Press the check box to have the digital blocks display the point number.

c. Display Point Tag: Set up the digital blocks to display the point tag by pressing the check box. You can also select whether the recorder displays the point tag in white or black text.

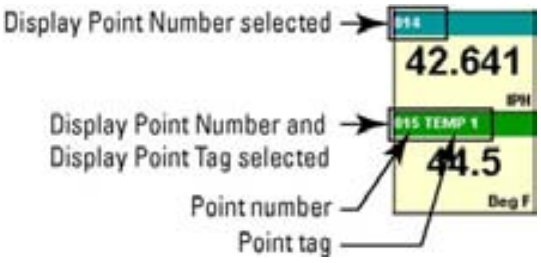

Figure 4–15.

3. Chart Speed Block:

   a. Auto Speed: Enable auto speed if you want the chart speed to switch to high when any point alarm is detected.

   b. Speed Unit: Press the button associated with the desired units.

4. Clear Unit at Startup: Enabling this function clears the historical trend data used to restore the first active trend screen type when the unit is power-cycled. Added for nuclear power plant simulator training.

5. Startup Screen: Press the text box repeatedly to cycle through the screens until the desired screen appears. The selected screen becomes the default screen on recorder power-up.

6. Auto Screen Switch:

   a. If enabled, auto switching occurs only when the recorder is displaying an active screen (bargraph, trend, alarm event, digital, overview, quad).

   b. Enter the cycle interval in seconds. Entering zero causes the instrument to switch from one screen to the next very rapidly.

   c. Select one of the switching modes. Periodic causes the instrument to switch from one screen to the next at the programmed intervals. You can then select which screens to include in the rotation.

      If you select Alarm and a point goes into an alarm state, the instrument automatically changes from any active display screen to the screen containing the point in alarm. The instrument locks on this screen. If a point that is assigned to another screen goes into alarm, the instrument switches to the second screen after the cycle time has elapsed.

If the alarms remain active and the ACK key has not been pressed, the instrument continues to cycle through all screens containing points in alarm. If the ACK key has been pressed, the instrument stops the rotation until a new alarm is detected.

7. Press **Close**.

System

Press Program > **System**.

Unit ID

Figure 4–16.

The Unit ID is displayed continuously on the button bar and is used as the primary directory name for history files on the removable media.

1. Press **Unit ID**, and press the text box.

2. Enter the ID you want to assign to this unit, and press **Close**.

Language

For this release, only English is fully supported. Contact the factory for details on obtaining support for other natural languages.

Passcodes

Figure 4–17.

You can program the recorder to require a passcode before allowing access to all the areas of the Program and Function menus.

1. Press the check box for Program Passcode and/or for Function Passcode.

2. Press the input box(es) to enter the passcode(s). Passcodes are case sensitive.

3. Press the associated check box for each Program and/or Function menu item that you want to passcode protect.

4. Press **Close**.

Initialize

Pressing **Initialize** causes a warning to appear. Press **Erase** only if you want the configuration erased and all values set to their defaults. Press **Cancel** to escape this screen.

Diagnostics

Diagnostics are addressed in the maintenance and troubleshooting section of Chapter 10.

Upgrade

1. Contact Thermo Fisher to receive the upgrade file.
2. Copy the file to the recorder PC card.
3. At the recorder, press PGM > System > **Upgrade**.
4. When prompted, enter the password provided by the factory.

   The recorder then saves the current configuration on the media and extracts the upgrade file. Note that once the process is complete, the recorder resets. You do not need to configure the recorder again.

Media Control

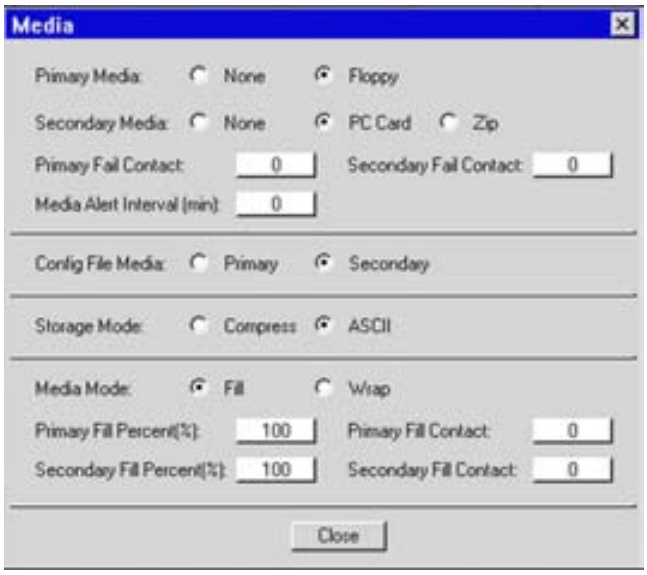

Figure 4–18.

1. Primary and Secondary Media Selections: Define the actual physical media drive types installed in your recorder by pressing the associated buttons.
2. Primary and Secondary Fail Contacts: The primary and secondary fail contacts allow for the assignment of a standard contact output to activate when any problem is detected with storing data to the removable media. Press the input boxes to assign the contacts. Press **OK**.

3. Media Alert Interval: The Media Alert window pops up on the display whenever a problem is detected with the removable media used for data storage. Press the input box. Enter the time in minutes between media alerts. Press **OK**.

4. Config File Media: Determine which media drive you want to use for File I/O operations that can save or load recorder configurations. Press the appropriate button.

5. Storage Mode

   a. Compress: Compressed files are written in binary and must be decompressed and opened in Thermo Fisher's Pronto software (part of the ProView Plus software package). These files are compressed a minimum of 50% more than ASCII files. Additional compression is dependent upon several functions:

      - Log interval (time between data storage)
      - Boundary setting (accuracy requirements)
      - Signal dynamics (input fluctuation)

      By ignoring boundaries and signal dynamics, you can compute the storage space used in compressed mode:

      ```
      ((7 * # of points + 7) * K) = storage space (bytes) per day
                  K is the number of logs per day
               K = 86,400/log interval in seconds
      ```

      Example: Log interval set to 10 seconds; total points to log is 4; K = 86,400/10 = 8,640 log/day

      ```
      ((7 * 4 + 7) * 8,640) = 302,400 bytes/day (assumes that
             all points are stored each log interval)
      ```

      When using compressed storage, the boundary setting and the variation of the signal data are major factors. Accuracy is also a consideration with boundary setting. The boundary for storage should be set to support the desired accuracy you wish to maintain for the particular points' stored data. The formula for determining the boundary setting follows:

      ```
      Boundary = Output Data Span * Desired Accuracy
      ```

      Example: Span of 0 to 20; accuracy of 0.1%

      Boundary = 20 * 0.001 = 0.02

The boundary can be set at 0.02, and any signal variation outside this range from the previous signal is stored to disk. Any signal not going outside of this range is ignored and not stored. Compression is dependent upon the fluctuation of the measured signal. A large amount of signal fluctuation results in less compression and a larger disk space requirement. Small signal fluctuation results in more and a smaller disk space requirement. The accuracy of the stored signal readings is maintained at the level you set.

b. ASCII: ASCII storage mode allows you to open the data files in a spreadsheet or a word processing program. However, ASCII format requires approximately two times the media space as compressed storage.

Once you have determined which storage mode to use, press the button associated with desired mode.

6. Media Mode
   a. Fill: Storage media fills to the end with data
   b. Wrap: Storage media fills to the end and begins writing over old data.

   Press the button associated with the desired media mode.

7. Primary and Secondary Fill Percentages: If you select Fill as the media mode, you must set a percentage of disk space the recorder fills before activating a low disk space alarm. Press the input box and enter the percentage you want to set. Press **OK**.

8. Primary and Secondary Fill Contacts: Assign the standard alarm contact used to signal a disk full alarm by pressing the input box and entering the contact number. Press **OK**.

File I/O

Access this menu item to save/load configuration files. Use standard save/load procedures for each.

Note that after you load a configuration file, you are prompted to allow the recorder to restart. Press **Yes**.

Chapter 5
Point Programming

General

Custom programming allows you to define functions and personalize features for performing specific applications and tasks. The programmed information is stored in nonvolatile memory. Programming is via menu-driven prompts.

Recorder Functions

The standard recorder is a 999-point recorder, of which a maximum of 80 points may be live inputs; these are typically voltages or currents. Multibank recorders may have a maximum of 80 locally multiplexed points and 840 remotely multiplexed points. Any point not being used to record or display live inputs may be used as a computational point. Inputs can be conditioned or scaled to display any range of engineering units.

There are four distinct levels of data handling:

- Conversion: Conversion applies only to live inputs and is the process of converting real-time analog signals into final engineering units for the point. There are six bipolar, full-scale ranges for all conversions: 50 mV, 100 mV, 200 mV, 1 V, 5 V, or 10 V dc, full scale. The converted values pass to a conditioning block which converts the binary value, effectively a percentage of full scale, into a value useful to the user.
- Conditioning: Conditioning includes converting the binary value into a representative voltage, conditioning and linearizing this voltage to represent, for example, a real world temperature as might be input by a thermocouple or RTD, and applying any other computation as required. The conditioning block handles all channels. The outputs from the conditioning block are referred to as base points and may be fed back to the inputs of the conditioning block to form the basis (base point) for other base point computations. This process includes tracking peak or valley values and calculating moving averages, timed averages, difference, totalization, or any other user-entered equation.

  The input to any point in the conditioning block can be any one of the base points or can be the live inputs. Live inputs can have input and output scaling applied in the conditioning block unless this is pre-defined by the nature of the input, such as thermocouples.

- Scaling: The outputs of the conditioning block are the values in the digital windows and are represented in common engineering units. The outputs of the conditioning block are also sent to a scale block where a display scale is applied to each point. The display scales determine what part of the full scale range is used by the display/record block.
- Display/record: These scale points are then applied to the display/record block which consists of the visual information or recorded information that the user requires. A maximum of 32 scaled points may be assigned to each bargraph and trend display type. All may be recorded to disk.

Programming

The recorder can be programmed remotely; however, the following sections apply to manually programming the unit from the front panel using the display and the touch screen.

Go to the Program menu. Each item may be password protected to prevent unauthorized access to the unit setup. Press **Apply** at each screen to save changes. New point programming parameters are saved in nonvolatile memory when you exit a programming session by pressing **Apply** on the Point Programming screen.

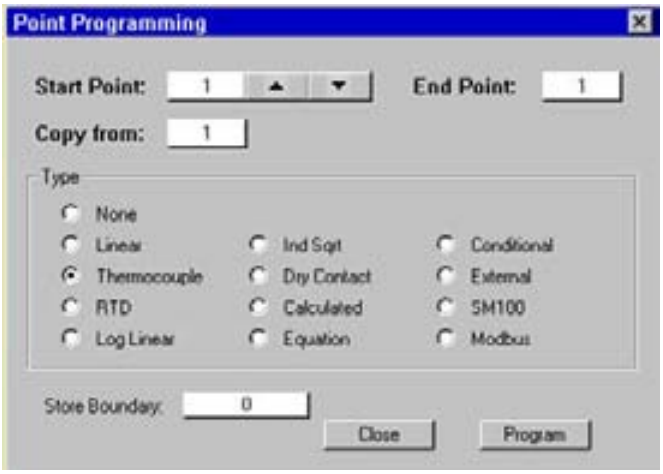

Figure 5–1.

1. Touch the **Start Point** number box, and a Point Set input box appears. Enter the point number you wish to program or the starting number for a range of points, and press **OK**.

   Continue to step 2 if you are programming a range of points. Otherwise, continue to the next section "Similar Programming Parameters."

2. If you are programming a range of points, touch the **End Point** box to enter the ending point number. Press **OK**.

   Before continuing to the Type section, note that if you have 2 or more points with the same parameters, you can copy the data from one point to another rather than entering data again for each point. Simply enter the start point, and press **Copy from:**. Enter the point with the parameters you want to copy, and press **OK**.

Note The parameters of the other points do not change if you change the parameters of the point you copied. For example, if you programmed point 4 by copying from point 2 and you change the parameters for point 2, point 4 does not change unless you use the Copy from function again. ▲

Similar Programming Parameters

Many of the point types share parameters that can be programmed in the same manner. To prevent repetition, these parameters are discussed in this section only. Any variations in programming the following parameters are addressed in the applicable sections.

Display Block

1. Point Tag: You can assign a tag (name), containing a maximum of 20 characters, to each programmed point. Press the text box, and use the keyboard to enter the point tag. Press **OK**.

2. Engineering Units: An alphanumeric engineering units message with a maximum of 20 characters may be assigned for voltage and current inputs. Press the text box and enter a units name. Press **OK**.

3. Display Scales: Point data is interpolated linearly across defined segments for linear scales. Scales are used to display and record all or part of the selected output scale. You can zoom all or part of the available range. Refer to Figure 5–2 for an example of using input and output scaling and to understand how scaling base points affects the data. An explanation of the figure follows.

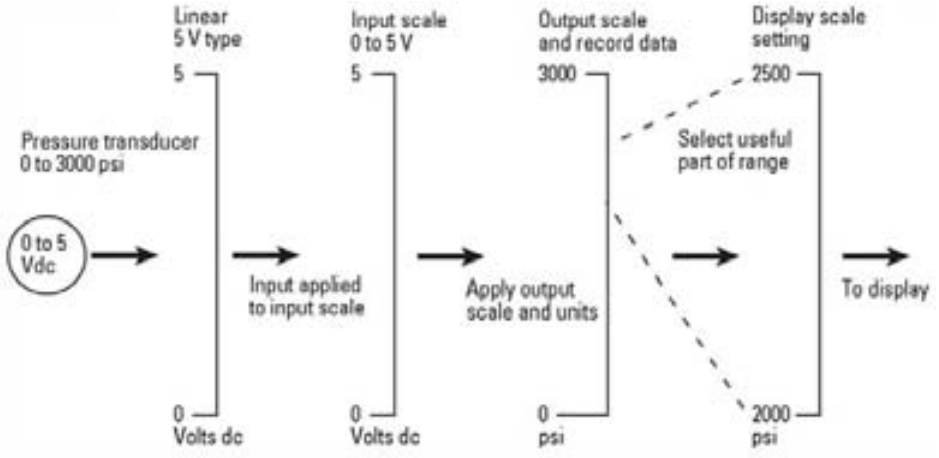

Figure 5–2. Input & output scaling example

a. Assume you want to record the output from a pressure transducer which gives a 0–5 Vdc output signal, which coincides to a pressure of 0–3000 pounds per square inch (psi). The process being monitored typically runs at 2200 psi ±5%; this is the area of interest. The transducer output which peaks at 5 V is connected to a live point, and the 5 V full-scale range is selected to cover this range.

   Since the maximum input voltage is only 5 V on a 5 V range, the input scale is set to a low end of 0.0 V and a high end of 5.000 V. To convert this directly to psi, the output scale is set to a low point of 0.0 psi and a high point of 3000.0 psi. The point now becomes 0 to 3000 for an input of 0–5 V, scaled linearly across the range. The engineering units can be set to psi, and the point tag can be set to any label that identifies this process variable.

b. To maximize the display resolution, set the display scales with a low end of 2000 and a high end of 2500. This scale point is now assigned to the bargraph and the chart graph. The display then charts from 2000–2500 psi, maximizing the display resolution for the value of interest. Set the low and high scales by pressing the associated boxes and entering the values.

4. Bands: The band feature enables you to easily identify a maximum of three ranges by applying colors to them. For example, three bands have been programmed for Point 1 in Figure 5–3. The bands are displayed in Figure 5–4. You can quickly locate the 5.000–10.000, 10.000–20.000 and 20.000–40.000 ranges and in what range the point falls.

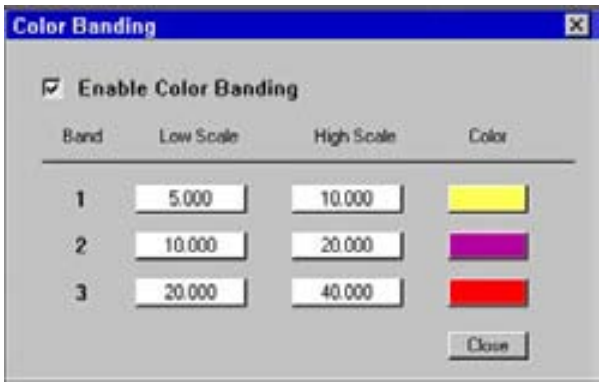

Figure 5–3.

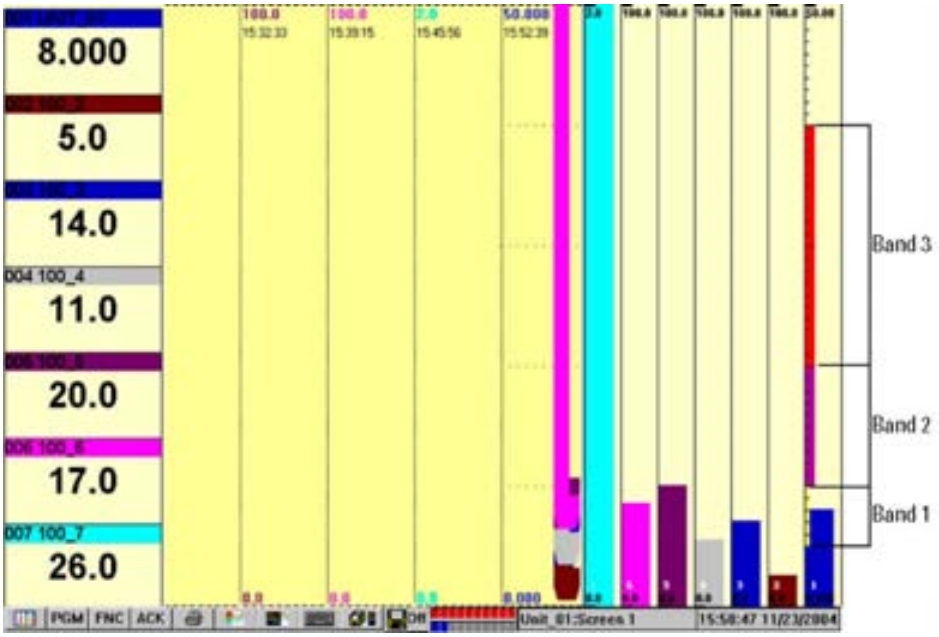

Figure 5–4.

5. Major, Submajor, and Minor Grids: You can enter a maximum of 50 major grids, 15 submajor grids, and 15 minor grids. Figure 5–5 shows how grids provide definition to the screen. Two major, 5 submajor, and 10 minor grids have been programmed in the example below.

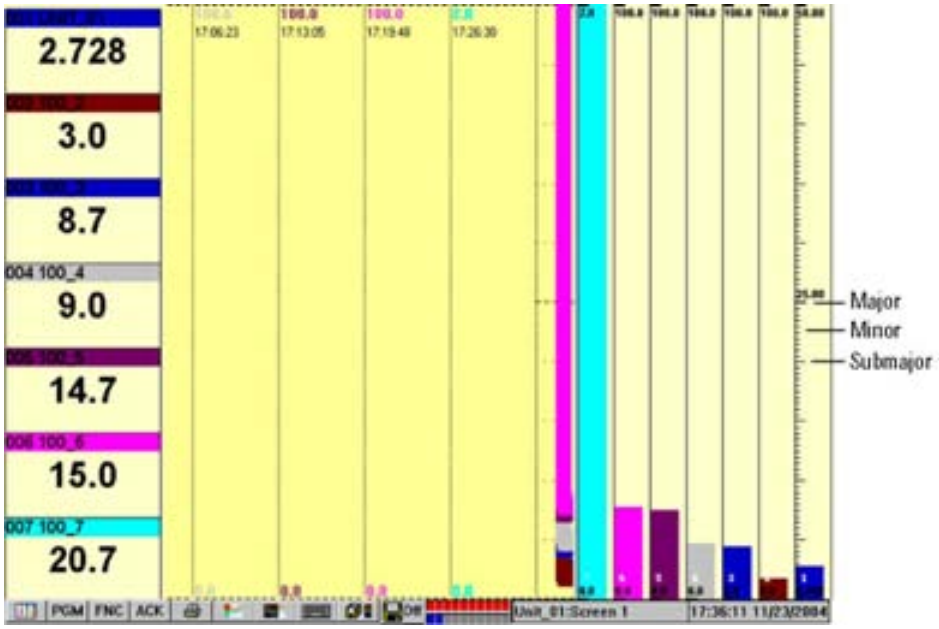

Figure 5–5.

6. Decimal Fix: Select the desired number of digits to the right of the decimal point: 0, 1, 2, 3, 4, or E (exponential).

7. Normal and Alarm Colors: You can set the normal pen trace, bargraph, or digital block color. Additionally, you can set pen trace or bargraph to display a different color if the point goes into alarm. Press the **Normal** or **Alarm** color box, select the desired color, and press **OK**.

Alarm Setup Block

A maximum of five alarms can be set for programmed points. These alarms can be any of the following alarm types:

- None: No alarm set
- Abnormal: Set alarms for abnormal conditions
- High: Set high alarms (up to five)
- Low: Set low alarms (up to five)
- Rate: Set rate alarms (up to five)

Certain parameters must be set when programming alarms:

1. Set point (for all alarms except None and Abnormal)

2. Contact number (for all alarms except None), 1 through 80

3. Rate in seconds (Rate alarm only), 1 to 300

4. Abnormal value: Assign a numeric value to be used for point data in the event the point is flagged as abnormal (TCBO, overrange, invalid, etc.). The value is returned on a Modbus poll and is used for base point data in Equation and Conditional point types.

5. Delay: Alarm delay can be set for all alarms assigned to each point. This parameter helps to prevent a point that rapidly changes in amplitude and direction from going into alarm. For example, if you do not want a point to indicate alarm and the point only stays in the alarm region for 3 seconds or less, set the delay for 3 seconds. This prevents any point that does not stay in the alarm region for more than 3 seconds from activating the alarm. Delay can be set from 0 to 14400 seconds.

6. Alarm Deadband: An alarm deadband can be set for all alarms for each point. This setting helps to prevent activation of alarms that are continuously activated by borderline changes in measured or calculated values above and below the alarm set point value. See Figure 5–6.

   a. Hi Alarm: Once activated, a Hi alarm does not clear until the value causing the alarm is less than the set point value minus the deadband setting.

   b. Lo Alarm: Once activated, a Lo alarm does not clear until the value causing the alarm is more than the set point value plus the deadband setting.

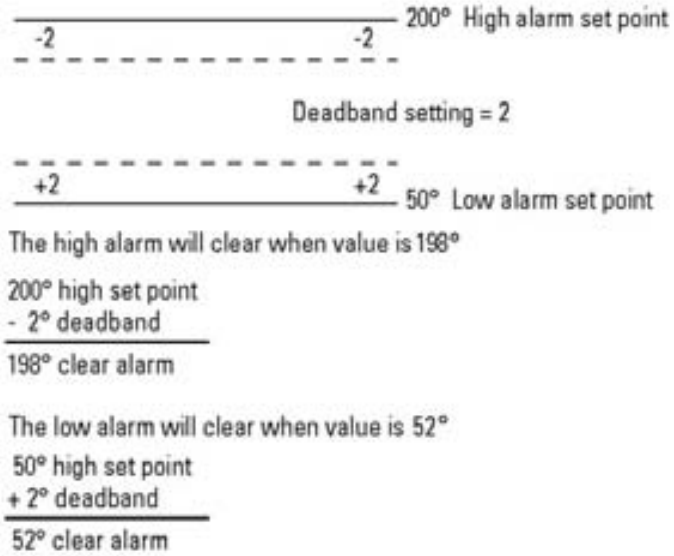

Figure 5–6.

Selecting a Point Type

Following are descriptions of the available point types and programming instructions.

None

The None type point is used to clear a point or range of points from any prior programming. Enter a point or range of points and press **None** in the Type block. Press **Program** and a dialog box appears asking if you want to delete the point or range of points. Press **Yes** to delete.

Linear

Select **Linear** as the type point when the input and output are to follow each other in a linear ratio. For example, if the point input is 0–1 V and the displayed scale is 0–10 GPM, a 0.2 V input equals 2 GPM output (what is displayed). This example uses a linear ratio of 1 to 10.

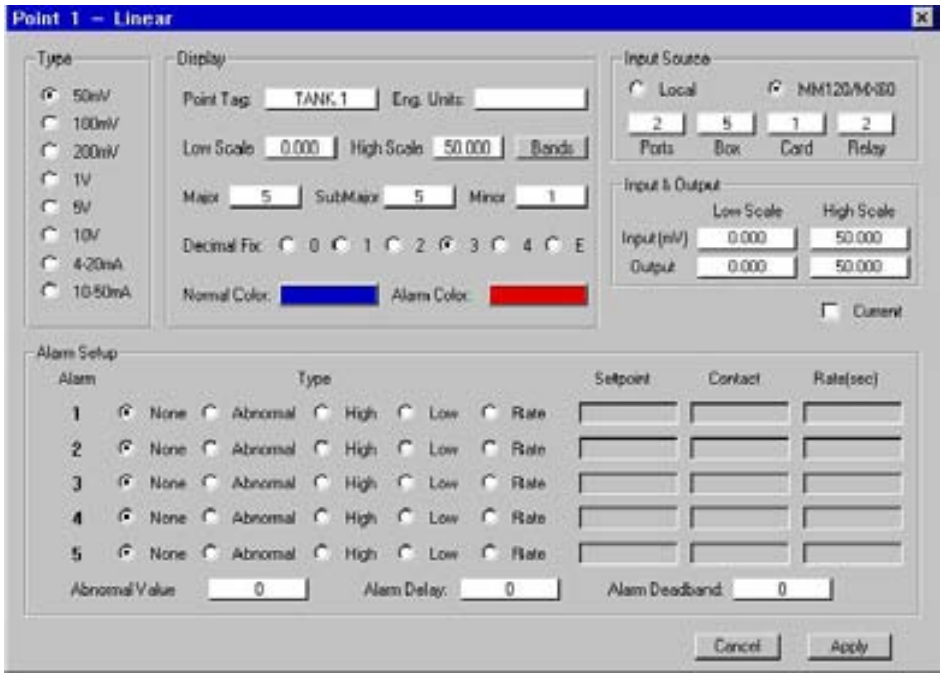

Figure 5–7. Linear type point programming

1. Type Block: Select from the predefined voltage input or current ranges.

   There are selections for two predefined, standard Current type inputs, including 4–20 mA (assumes the use of a 50-ohm shunt resistor and is automatically measured on the 1 V range) and 10–50 mA (assumed the use of a 100-ohm shunt resistor and is automatically measured on the 5 V range).

If (a) current inputs are not predefined, (b) it is desired to use any selectable voltage range, and/or (c) it is desired to use a different shunt resistor for a current input, use Ohm's Law to determine the appropriate low and high end input voltages: E = IR, where E = equivalent voltage inputs, I = current in mA, R = precision shunt resistance value.

2. Display Block: Refer to the "Similar Programming Parameters" section for instructions.

3. Input Source: If you are programming a standard unit, the only option you have is Local. The MM120/MX60 option (shown in Figure 5–7) is not available.

   If you are programming a unit with multibank capabilities, this section allows you to select input from a local source or from other Thermo Scientific multiplexers (MM120/MX60). Additional parameters must be programmed if you select MM120/MX60:

   Table 5–1.

Parameter	Description
Ports	Enter the port which connects the recorder to the multiplexer (1 or 2).
Box	Enter the number assigned to the box (1–7).
Card	Enter the card in the multiplexer you want the recorder to read (1–6).
Relay	Enter the point number on the card you want the recorder to read (0–9).

4. Input & Output Block:

   a. Input Low and High Scales: The input scale set must remain within the input point type range for the point. For example, if you select a point type of 5 V (±5 V range) and your input signal is 2–5 V, you can set the input scale for 2–5 V. You may not set the input scale for a voltage of greater than or less than the ±5 V of the point type selected. Set the low and high input scales by pressing the associated input boxes. Enter the desired value and press **OK**.

b. Output Low and High Scales: The output scale is programmed to convert the input into the correct unit value of the measurement. For example, if your input scale is set at 2–5 V, which translates into 1000–4000 psi from a pressure transducer, set the low output scale to 1000 and the high output scale to 4000 with the units set to psi. The recorder correlates an input of 2 V with a pressure of 1000 psi and an input of 5 V with a pressure of 4000 psi. Set the low and high output scales by pressing the associate input boxes. Enter the desired value and press **OK**.

5. Filter: The digital filter smoothes noisy or erratic signals by attenuating the effects of sudden transitions. Figure 5–8 displays the effect of the digital filter on inputs. The filter is programmable from 0 to 600 seconds in one-second increments. Press the **Filter** input box, enter the desired filter seconds, and press **OK**.

Note Filter is not available if you selected MM120/MX60 as the input source. ▲

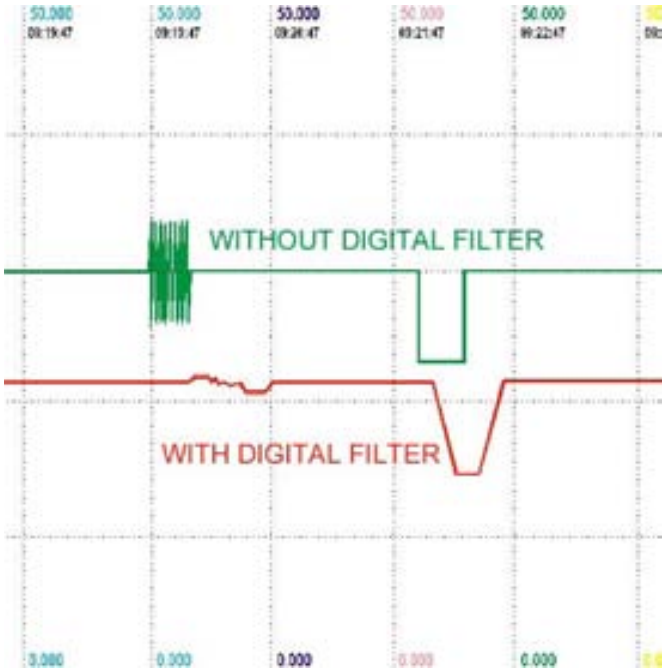

Figure 5–8.

6. Current: Currents must be enabled to measure a passive resistance to the recorder. The recorder uses a precision current source to measure resistance. If a resistance, other than an RTD, is entered into an input, this function must be enabled. Refer to the following example.

Passive resistance to be measured is 0–1500 ohms. With 2 mA of current and Currents function enabled, apply the following formulas:

```
Current x Lowest Resistance = Lowest Voltage
Current x Highest Resistance = Highest Voltage
```

If the current is 2 mA and the lowest resistance is 0 ohm then:

```
0.002 x 0 = 0 V (lowest voltage)
0.002 x 1500 = 3 V (highest voltage)
```

Thus, if using the 5 V point type and the input scale is set from 0–3 V, the output scale should be programmed as 0–1500 ohms.

Do not turn the Currents function ON for any input types other than resistance inputs, as inaccurate readings will result. Enable this function by pressing the Current check box.

7. Alarm Setup Block : Refer to the “Similar Programming Parameters” section for instructions.

Thermocouple

This type measures temperature.

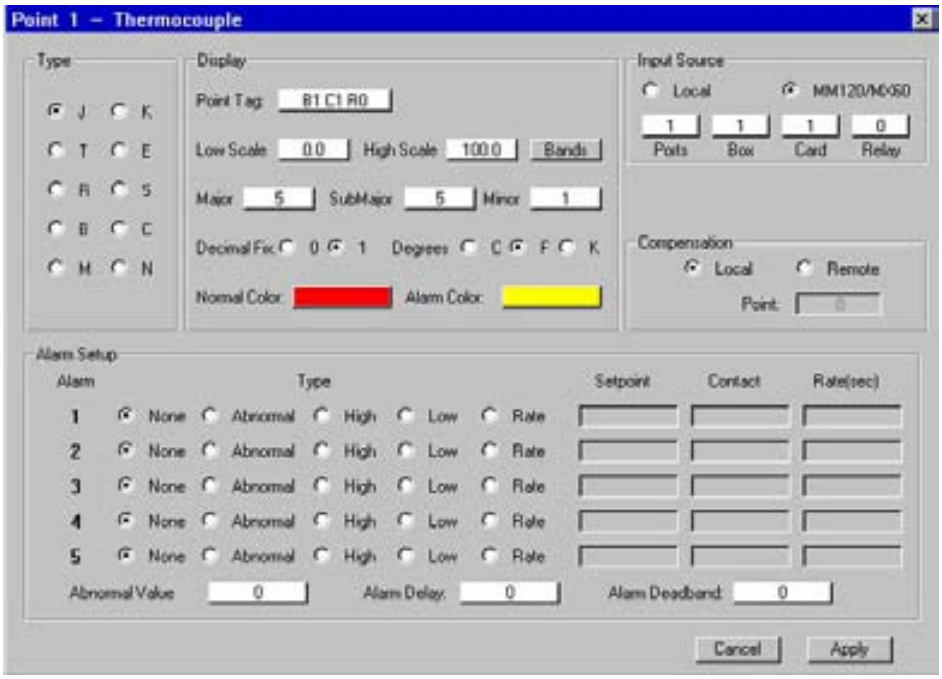

Figure 5–9. Thermocouple type point programming

1. Type Block: Select one of the available types: J, K, T, E, R, S, B, C, M (NI-NI MOLY), or N (NICROSIL-NISIL).

2. Display Block: Refer to the "Similar Programming Parameters" section for instructions. **Note the following differences:**
   - Eng. Units: Not available.
   - Decimal Fix: Only available options are 0 and 1.
   - Degree: Select degrees in Celsius (C), Fahrenheit (F), or Kelvin (K).

Note Units in degrees Kelvin is not supported in this release. ▲

3. Input source: Refer to step 3 in the Linear type point programming section.

4. Filter: Refer to step 5 in the Linear type point programming section.

Note Filter is not available if you selected MM120/MX60 as the input source. ▲

5. Compensation: Thermocouple compensation can be local (from a recorder internal temperature sensor) or external (through a point).
   a. Local Compensation: When thermocouples are compensated locally, temperature sensors (located at the rear terminal plate of the recorder) are used to determine the cold-junction compensation required by the physical connection of thermocouple wire at the recorder input terminals.
   b. Remote Compensation: As an alternative to using local compensation and thermocouple wire, a single recorder input can be set to measure the cold-junction temperature at a remote location (where the thermocouple-to-copper wire transition occurs). Copper wire may then be used for the rest of the thermocouples from the remote junction to the recorder inputs instead of thermocouple wire.

      The point used as the measurement source of the remote cold junction source is referred to as the compensation channel. Press **Remote**, followed by the **Point** text box. Enter the point number and press **OK**.

6. Alarm Setup Block: Refer to the "Similar Programming Parameters" section for instructions.

RTD RTD type points are used to measure temperature.

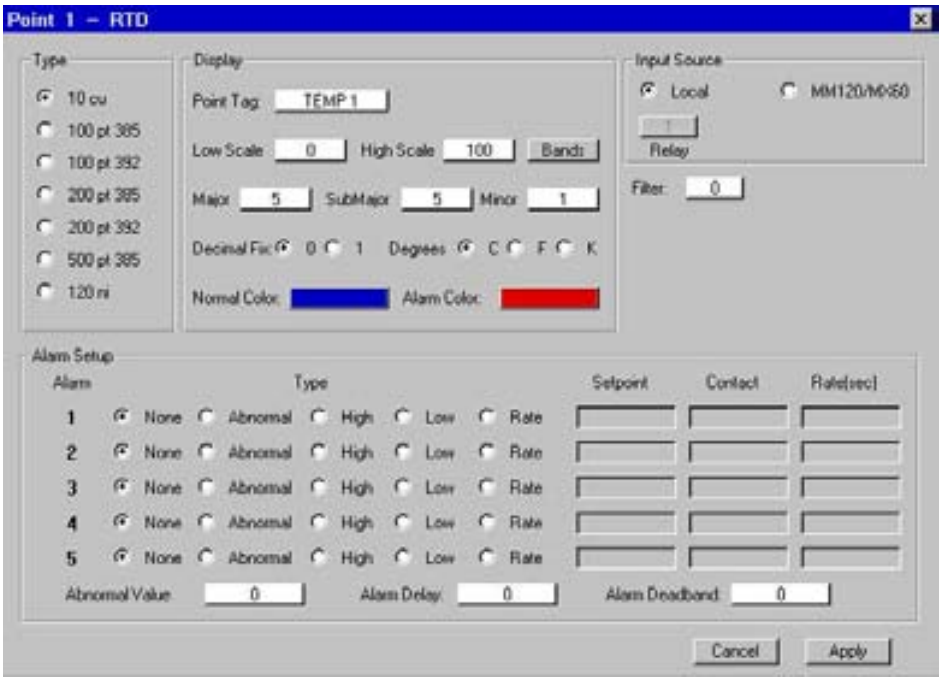

Figure 5–10. RTD type point programming

1. Type Block: Select the appropriate RTD type.

2. Display Block: Refer to the “Similar Programming Parameters” section for instructions. **Note the following differences:**
   - Eng. Units: Not available.
   - Decimal Fix: Only options available are 0 and 1.
   - Degree: Select degrees in Celsius (C), Fahrenheit (F), or Kelvin (K).

Note Units in degrees Kelvin is not supported in this release. ▲

3. Input Source: Refer to step 3 in the Linear type point programming section.

4. Filter: Refer to step 5 in the Linear type point programming section.

Note Filter is not available if you selected MM120/MX60 as the input source. ▲

5. Alarm Setup Block: Refer to “Similar Programming Parameters”.

Log Linear

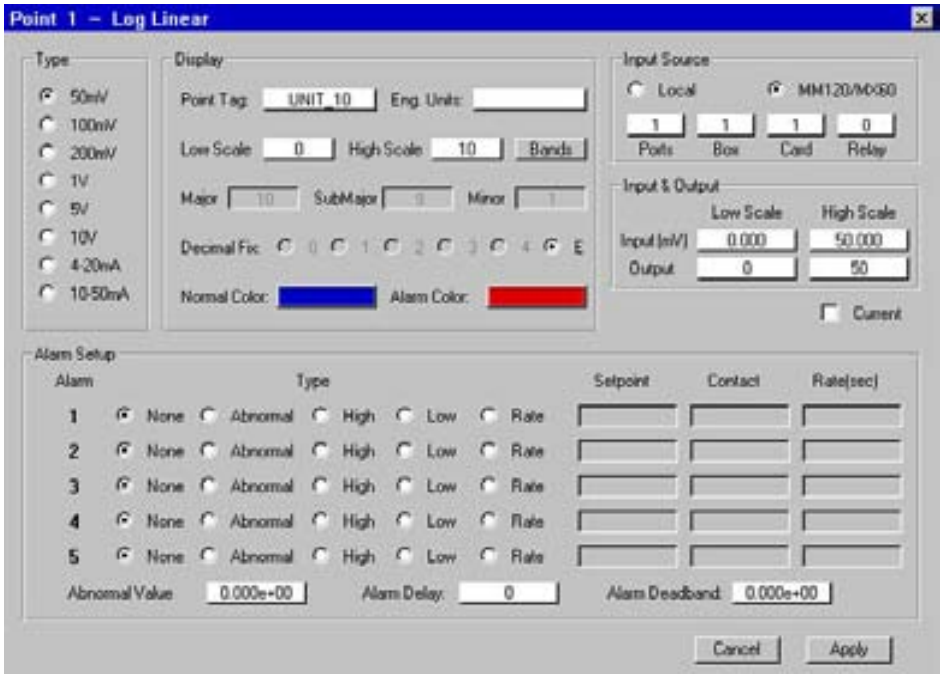

Figure 5–11. Log Linear type point programming

1. Type Block: Refer to step 1 in the Linear type point programming section.

2. Display Block: Refer to the "Similar Programming Parameters" section for instructions. **Note the following differences:**

   - Major/Submajor/Minor Grids: Not programmable. Grids are fixed based on the number of log scale decades.
   - Decimal Fix: Not programmable. Log points displayed as base 10 exponentials.

3. Input source: Refer to step 3 in the Linear type point programming section.

4. Input & Output Block: Refer to step 4 in the Linear type point programming section.

5. Filter: Refer to step 5 in the Linear type point programming section.

Note Filter is not available if you selected MM120/MX60 as the input source. ▲

6. Current: Refer to step 6 in the Linear type point programming section.

7. Alarm Setup Block: Refer to the “Similar Programming Parameters” section for instructions.

Ind Sqrt

Use this function for inputs requiring the Industrial Square Root of the input signal. The square root of the percentage of input scale is calculated and then multiplied by the high end scale to produce the value of the point displayed. In the following example, the input is 4–20 mA, low end scale = 0, and high end scale = 1000:

$$\text{High end scale} = 1000 \text{ gal./min.}$$
$$\text{Input signal} = 12 \text{ mA or } 50\% \text{ of scale equal to } 0.5$$

$$\text{Square root of } 0.5 = 0.707 \rightarrow 0.707 \times 1000 = 707 \text{ gal./min.(decimal fix} = 0).$$

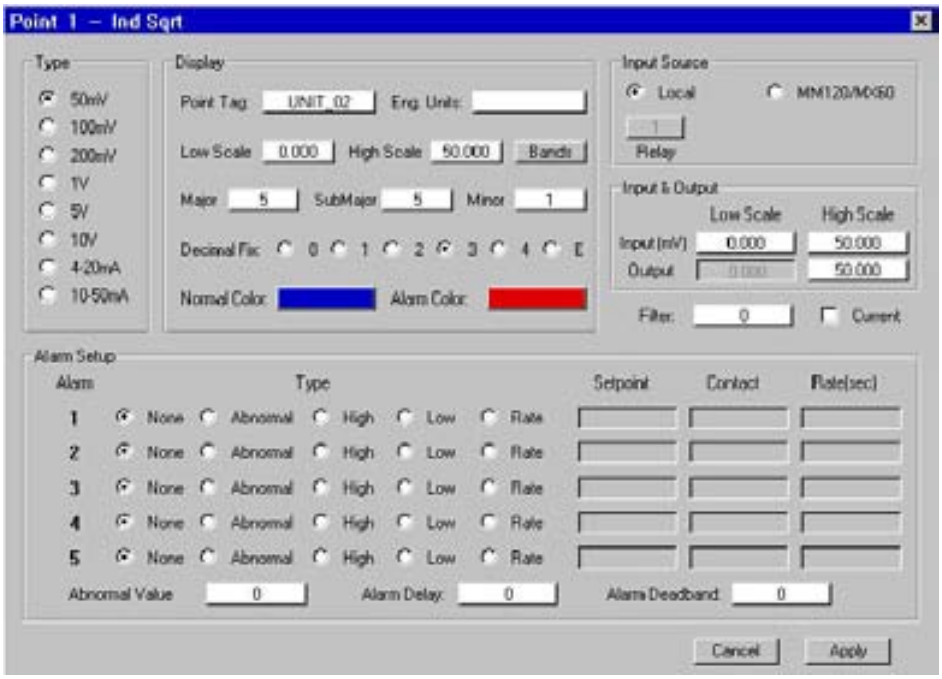

Figure 5–12. Ind Sqrt type point programming

1. Type Block: Refer to step 1 in the Linear type point programming section.

2. Display Block: Refer to “Similar Programming Parameters”.

3. Input source: Refer to step 3 in the Linear type programming section.

4. Input & Output Block: Refer to step 4 in the Linear type point programming section. **Note that the Low Scale Output entry is not available.**

5. Filter: Refer to step 5 in the Linear type point programming section.

Note Filter is not available if you selected MM120/MX60 as the input source. ▲

6. Current: Refer to step 6 in the Linear type point programming section.

7. Alarm Setup Block: Refer to "Similar Programming Parameters" section for instructions.

Dry Contact

The dry contact point type allows a point to be programmed to detect an open or closed contact. Programmable parameters for dry contact point types are nearly identical to those for linear point types.

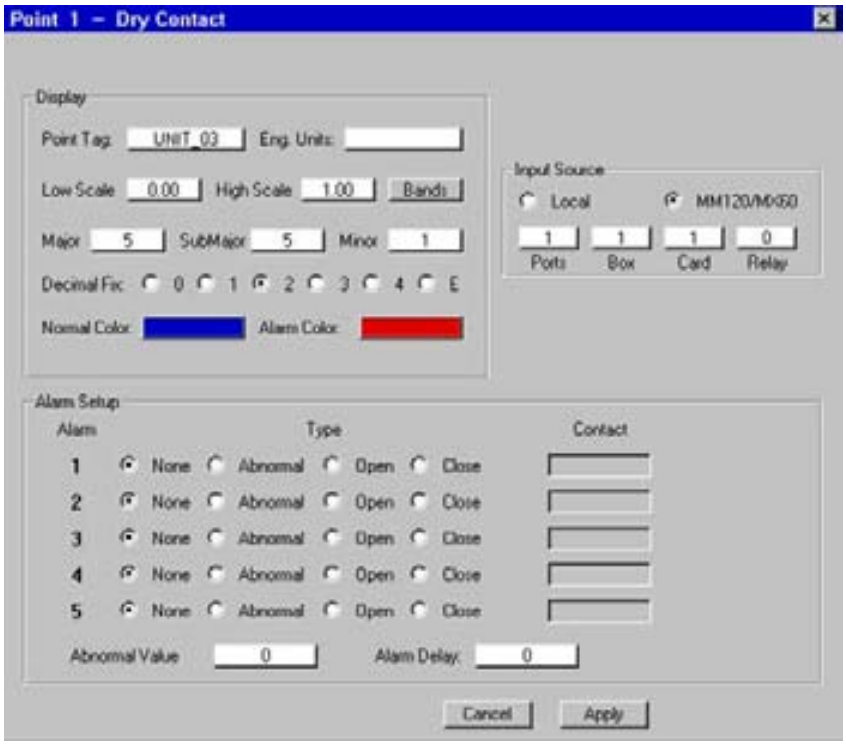

Figure 5–13. Dry Contact type point programming

1. Display Block: Refer to the "Similar Programming Parameters" section for instructions.

2. Input source: Refer to step 3 in the Linear type point programming section.

3. Alarm Setup Block:

   a. Type: Only available options are None, Abnormal, Open, and Closed alarm types. Make the desired selection and set up the contact number (does not apply if you select **None**).

   b. Abnormal Value and Alarm Delay: Refer to step 5 in the "Alarm Setup Block" section of "Similar Programming Parameters."

Calculated

Calculations are performed on the instantaneous value of one or more points. The calculations are performed after each scan of all measured inputs.

- High Peak, Low Peak, Time Average: High peak calculated type points track the highest data of a given point. This data is stored until some form of reset occurs. When the data is reset the high peak point data is printed on the chart along with the time the peak value occurred.

  Low peak calculated type points track the lowest data of a given point. This data is stored until some form of reset occurs. When the data is reset the low peak point data is printed on the chart along with the time the peak value occurred.

  Time average calculated type points calculate a continuous average of the measured or processed value of a given point. The value of the average at the time of reset represents the true average of the base points' data since the previous reset time.

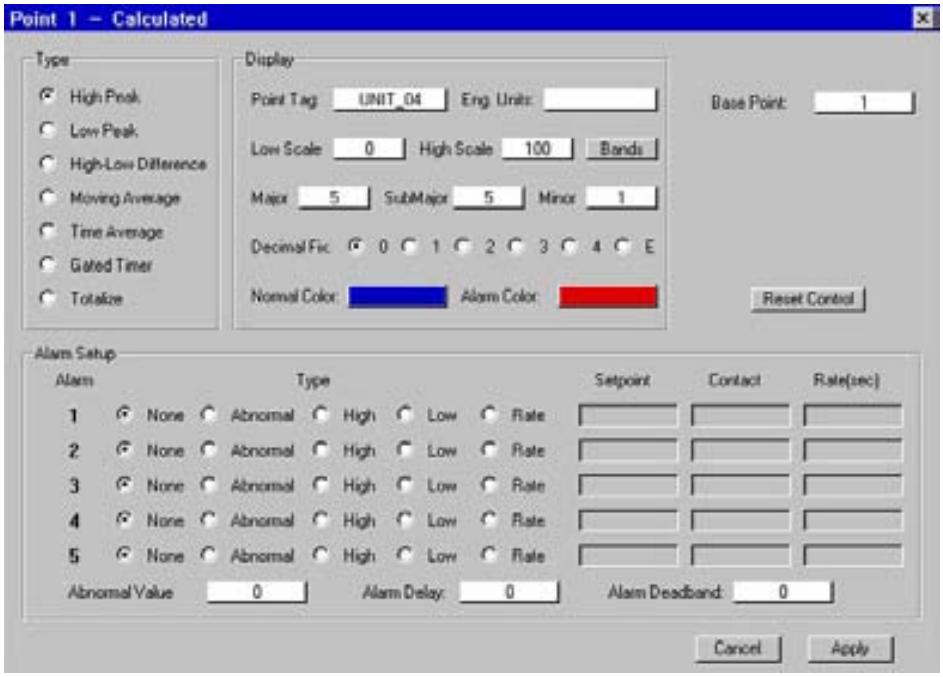

Figure 5–14. Hi Peak Calculated type point programming

1. Type Block: Select **High Peak**, **Low Peak**, or **Time Average**.

2. Display Block: Refer to the "Similar Programming Parameters" section for instructions.

3. Base Point: High peak, low peak, and time average calculations must be performed on another point. This point is referred to as the base point. To establish the base point, press the **Base Point** input box and type in the base point number. Press **OK**.

4. Reset Control: It may be desirable to have a Totalize, Gated Timer, High Peak, or Low Peak point type be reset at a specified event or at periodic intervals. Press the **Reset Control** button to program a reset.

Figure 5–15.

a. Reset Event: Event reset causes calculated points to be reset upon an event switch closure. Press the input box and enter the event number to be used to reset the point. Press **OK**.

b. Reset Time Block:

   i. Auto Reset: Set up this function if you want the point to reset at certain intervals. You can program the reset to occur daily, weekly, or monthly. Daily causes the point to reset at the top of each hour throughout the day. For example, programming the daily reset for a start time of 12:00 and with 1:00 intervals causes the point to reset hourly, beginning at 12:00. Press **Daily**, and continue to Start (hh:mm).

      Weekly causes the point to reset once a week at the start time set and on the weekday you set. For example, programming the weekly reset for a start time of 12:00 on Wednesdays causes the point to reset every Wednesday at 12:00 that day. Press **Weekly**, and the Interval (hh:mm) input becomes Weekdays (Mon–Sun). Press the input box repeatedly until the desired day of the week is displayed. Continue to Start (hh:mm).

      Monthly causes the point to reset once a month at the start time set and on the day of the month you set. For example, programming the reset for a start time of 12:00 on the twentieth day of the month causes the point to reset every month on the twentieth at 12:00 that day. Press **Monthly**, and the Interval (hh:mm) input becomes Day (1–31). Press the input box and enter the desired date.

   ii. Start (hh:mm): Press the input box, and enter the start time in a 24-hour format (hh:mm). Press **OK**.

   iii. Interval (hh:mm): This value establishes the reset intervals. The high or low peak value is automatically logged to the alarm/event summary before the value is reset if the Save on Reset function is enabled. Press the input box, and enter the interval time in a 24-hour clock format (hh:mm). Press **OK**.

      The programmable start time may not be the time at which the first log/reset occurs when enabling the Auto Reset and Save on Reset functions. However, a log/reset always occurs at the start time every day. The actual first log/reset depends upon the current time and the assigned interval. The recorder calculates the first log/reset by repeatedly adding the interval to the start time until the current time is met or exceeded. Refer to the following example.

Current Time: 07:30	09:15 Programmed start time
Start Time: 09:15	10:15
Timed Interval: 1 hour	11:15
	12:15

Note: The 1-hour interval added to the start time yields log/reset times.

.

23:15

.

07:15

07:30 Current time

08:15 Time of first log/reset

When High Peak, Low Peak, and Time Average calculated type points are reset, the new value is the current base point value at the time of reset. When Totalize and Gated Timer type points are reset, the new value is zero.

iv. Continue After Power Cycle: If not checked, Totalize, High Peak, and Low Peak point types are reset after a power cycle. The values from just before the power down are saved to the alarm-event file and shown on the Alarm Event Summary screen. If checked, these point types will *not* be reset after a power cycle. Instead, they are preloaded with values just before the power down.

Note Totalize point types are reset to 0.0000. ▲

Note High Peak and Low Peak point types are reset to the first scan values of their respective base points. ▲

5. Alarm Setup Block: Refer to the “Similar Programming Parameters” section for instructions.

- High-Low Difference: This calculated type point takes the difference between the lowest and highest values in a range of points. The final data for a high-low difference point type is derived by subtracting the lowest point data in the range of points from the highest data.

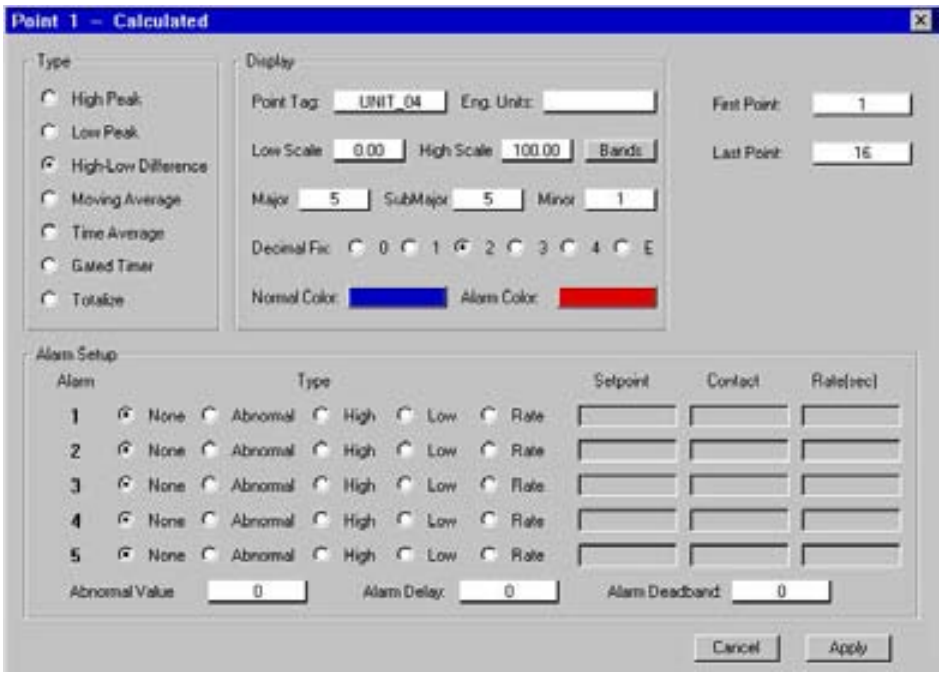

Figure 5–16. High-Low Difference calculated type point programming

1. Type Block: Select **High-Low Difference**.

2. Display Block: Refer to the “Similar Programming Parameters” section for instructions.

3. First Point and Last Point: The high-low difference point is the average of the first and last points. For example, within the range of points assigned to the Hi-Lo difference point type, if the highest point data value is 100 and the lowest is 90, the high-low difference data will be 10. Press the **First Point/Last Point** box, and enter the point number. Press **OK**.

4. Alarm Setup Block: Refer to the “Similar Programming Parameters” section for instructions.

- Moving Average: A moving average point calculates the continuous average of the measured or processed value of a selected point. A description of the moving average function and an application follows.

  Moving Average Function: Description

  EACH SECOND:

  Newest One_Second_Average is computed by averaging all data accumulated in the last second.

  Oldest One_Second_Average replaced by newest One_Second_Average in the Second_Averages_Buffer.

  EACH MINUTE:

  Newest One_Minute_Average computed by averaging last 60 One_Second_Averages from the Second_Averages_Buffer.

  Oldest One_Minute_Average Replaced by newest One_Minute_Average in the Minute_Averages_Buffer.

  Final data for the moving average point type is computed by averaging the number of most recent minute averages required by the Time Period.

  Moving Average Function: Application Example

  PROCESS: Process temperature input is monitored by one point assigned to the recorder. It is desired to have a second point continuously reflect the hourly average temperature of the process.

  SETUP: Program point number 1 to the recorder as the temperature monitoring input. Program point number 2 to the recorder as a calculated/moving average. Assign point number 1 as the base point. Set a time period of 60 minutes (1 hour).

  RESULT: Point number 2 continuously reflects the true rolling average of temperature for the previous 1-hour period.

  Maximum time period is 360 minutes (6 hours).

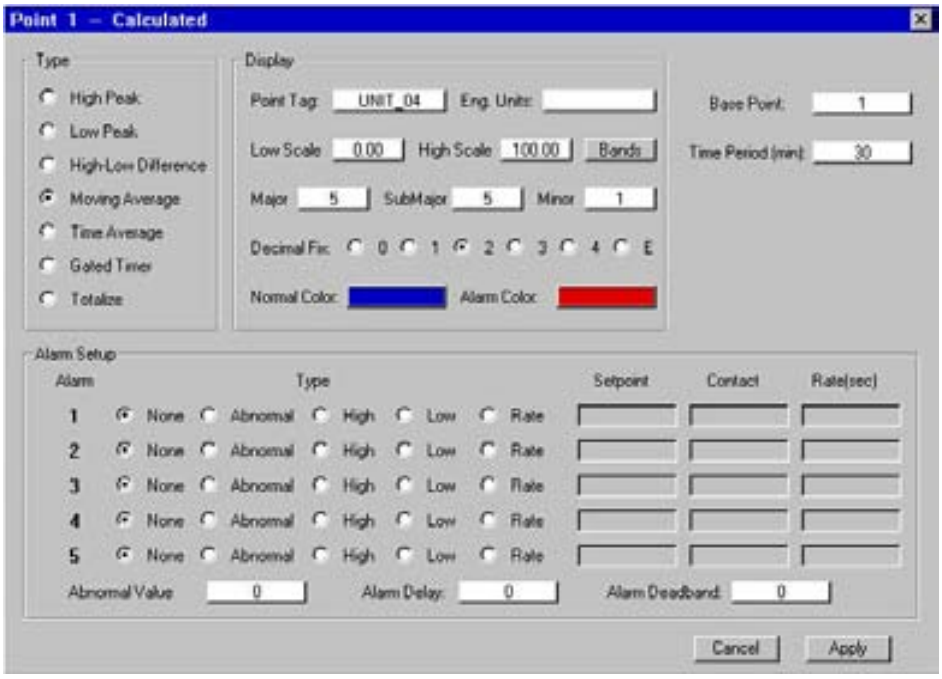

Figure 5–17. Moving Average Calculated type point programming

1. Type Block: Select **Moving Average**.

2. Display Block: Refer to the “Similar Programming Parameters” section for instructions.

3. Base Point: Moving average calculations must be performed on another point. This point is referred to as the base point. To establish the base point, press the **Base Point** input box and type in the base point number. Press **OK**.

4. Time Period (min): This is the length of time in which values are averaged. Press the input box, and enter the time in minutes. Maximum length of time is 480 minutes.

5. Alarm Setup Block: Refer to the “Similar Programming Parameters” section for instructions.

- Gated Timer: The gated timer function allows a timer, measuring in seconds, to be controlled by a "gate" from a logic point. For example, if a point is measuring temperature and you want to know the total amount of time the temperature measured by this point is above or below a certain level, you can program a conditional type point to be "true" only when the temperature is above or below a set level.

  A gated timer point can then be programmed to be turned ON only when the conditional point is in the true state. The gated timer point only accumulates seconds when the temperature is above or below a set level. The timer continues to accumulate time each time it is turned on. The point can also be reset at programmed time intervals and alarms can be set to alarm if the timer total goes above a programmed time interval in seconds.

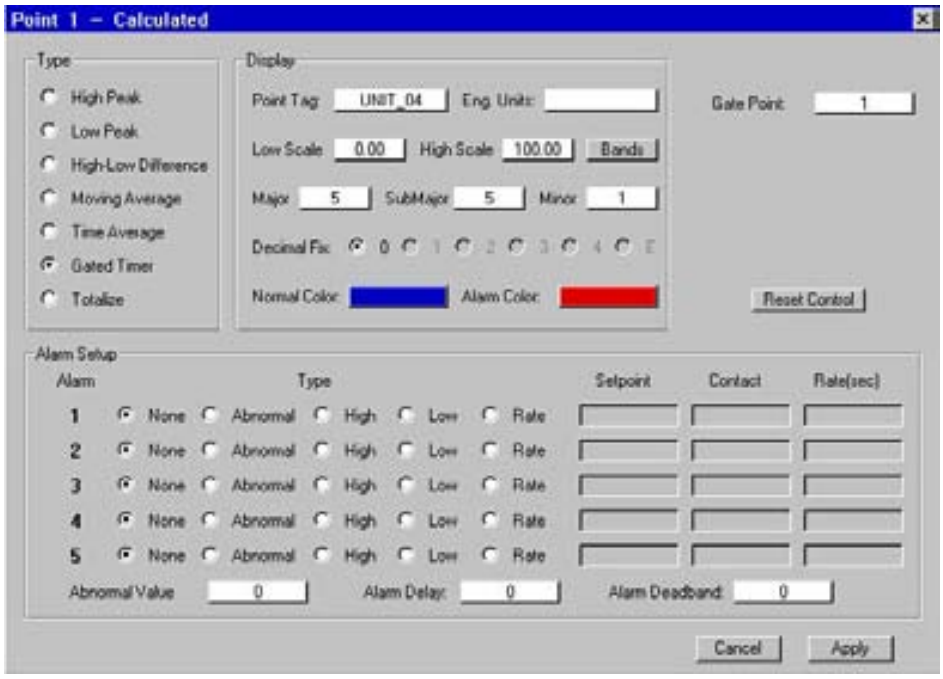

Figure 5–18. Gated Timer Calculated type point programming

1. Type Block: Select **Gated Timer**.

2. Display Block: Refer to the "Similar Programming Parameters" section for instructions. **Note that the only available Decimal Fix selection is 0.**

3. Gate Point: If a base point of 0 is specified, the gated timer runs continuously until reset. If a valid point (1–999) is assigned as the base point, the timer accumulates seconds only when the base point evaluates to be True.

4. Reset Control: Refer to Reset Control in the "High Peak, Low Peak, Timed Average" section for instructions.

5. Alarm Setup Block: Refer to the "Similar Programming Parameters" section for instructions.

- Totalize: The totalize calculation keeps a running total of the value of a point sampled at a programmed rate. This continues until the programmed reset interval time, at which time the value is logged to the alarm/event summary, reset to zero, and the totalization calculation begins again. However, a low flow cutoff provision prevents totalization on flow rates that fall below the cutoff point.

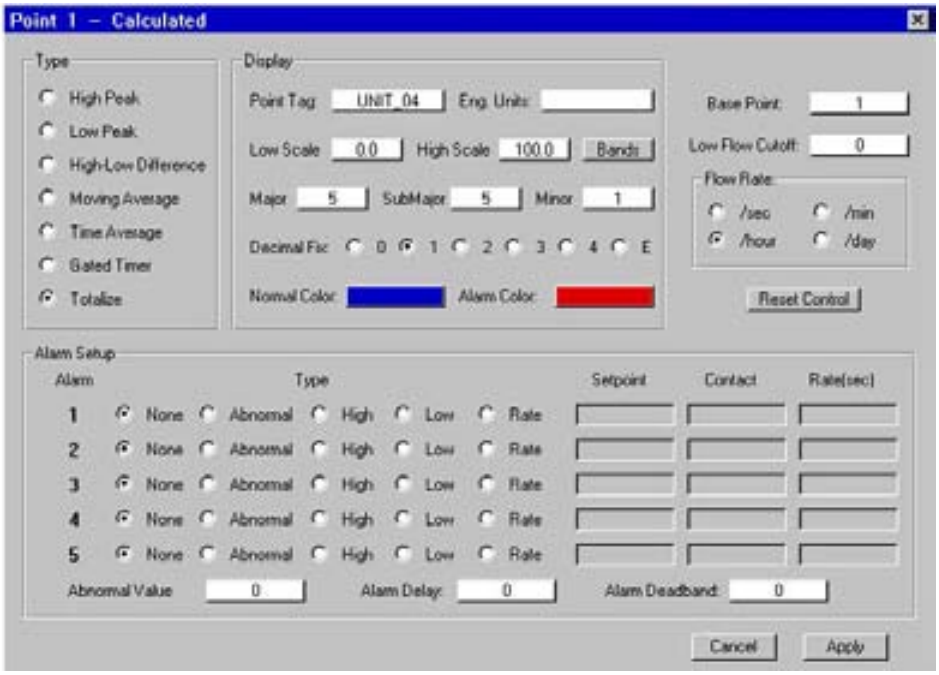

Figure 5–19. Totalize Calculated type point programming

1. Type Block: Select **Totalize**.

2. Display Block: Refer to "Similar Programming Parameters".

3. Base Point: Totalize calculations must be performed on a base point. To establish the base point, press the **Base Point** input box and enter the number. Press **OK**.

4. Low Flow Cutoff: This function allows you to program a low flow cutoff. If the base point (flow point) flow rate falls below the low flow cutoff, the total is frozen at the current value. Press the input box and enter the value number. Press **OK**.

5. Flow Rate: Select one of the available flow rates: per second, per minute, per hour, or per day.

6. Reset Control: Refer to Reset Control in the "High Peak, Low Peak, Timed Average" section for instructions.

7. Alarm Setup Block: Refer to the "Similar Programming Parameters" section for instructions.

Equation

This type of point allows you to perform algebraic calculations based on another point's (or other points') current data, events, and predefined numeric constants. A total of 40 operators and operands may be used in an equation. If longer equations are required, multiple equation point types may be concatenated (linked together) to obtain the desired final equation and result. If an equation is not constructed properly, an "Error: Invalid Data" dialog box displaying "Illegal Equation" appears.

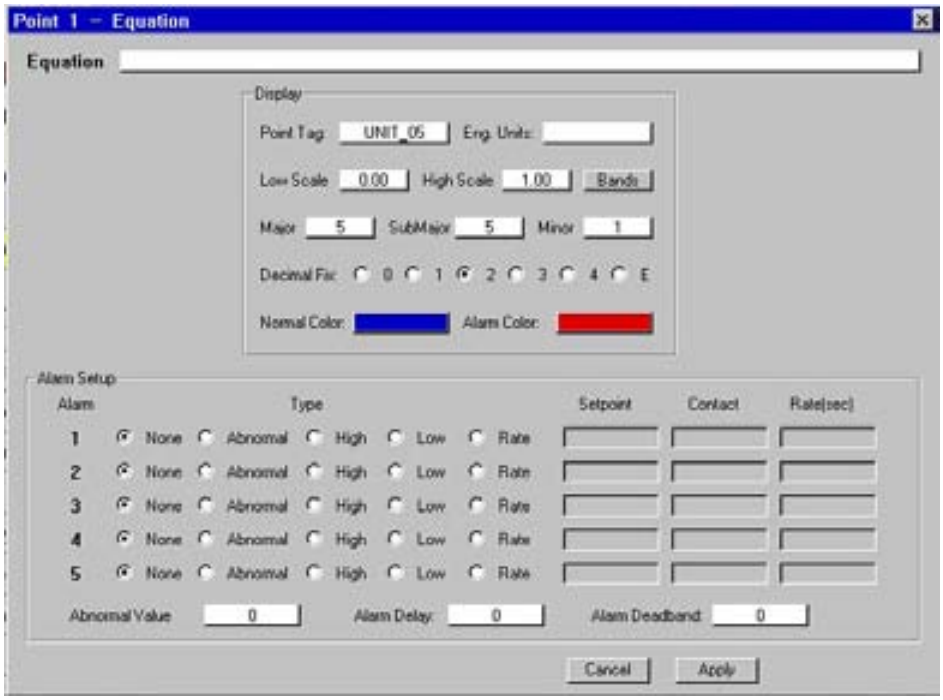

Figure 5–20. Equation type point programming

1. Equation: Set up the equation by pressing the input box. Create or modify an equation by using the keypad (Figure 5–21) and referring to Table 5–1. Press **Exit** to accept the equation.

Figure 5–21. Equation entry keypad

Table 5–2.

Operator	Function	Operator	Function
P1–P999	Represent points	^	Fractional exponentiation X^y
K1–K64	Represent constants	)	Close parenthesis
E1–E60	Represent events	(	Open parenthesis
+	Add	Sqr	Square root
-	Subtract	Ln	Nature logarithm
*	Multiply	Log	Base ten logarithm
/	Divide	Exp	Natural log (E^y)

2. Display Block: Refer to the “Similar Programming Parameters” section for instructions. **Note that submajor grids are not available for programming.**

3. Alarm Setup Block: Refer to the “Similar Programming Parameters” section for instructions.

Note When used in Equation type points, the contact input point evaluates to 0 = Open, 1 = Closed. ▲

Conditional

Use this point type to set a list of operating conditions for a point that evaluates as True or False. A total of 40 operators and operands may be used in an equation. If longer equations are required, multiple equation point types may be concatenated (linked together) to obtain the desired final equation and result. If an equation is not constructed properly, an "Error: Invalid Data" dialog box displaying "Illegal Equation" appears.

Figure 5–22. Conditional type point programming

1. Equation: Set up the equation by pressing the input box. Create or modify an equation by using the keypad and referring to Table 5–2. Press **Exit** to accept the equation.

Figure 5–23. Equation entry keypad

Table 5–3.

Operator	Function	Operator	Function
P1–P999	Represent points	>	"Greater than"
K1–K64	Represent constants	)	Close parenthesis
E1–E60	Represent events	(	Open parenthesis
!	"Not"	!=	"Not equal to"
|	"Or"	=	"Equal to"
&	"And"	<=	"Less than or equal to"
<	"Less than"	>=	"Greater than or equal to"

2. Display Block: Refer to the "Similar Programming Parameters" section for instructions. **Note the following differences:**
   a. Submajor grids: Not available.
   b. Bands: Not available.

3. Alarm Setup Block: Refer to the "Similar Programming Parameters" section for instructions. **Note the following differences:**
   a. Type: Available alarms include None, Abnormal, True, False.
   b. Abnormal Value and Deadband: Not available.

Note When used in Conditional type points, the contact input point evaluates to False = Open, True = Closed. ▲

External

External type points use data sent via the RS232, RS485, or Ethernet ports to the recorder for trending or other uses.

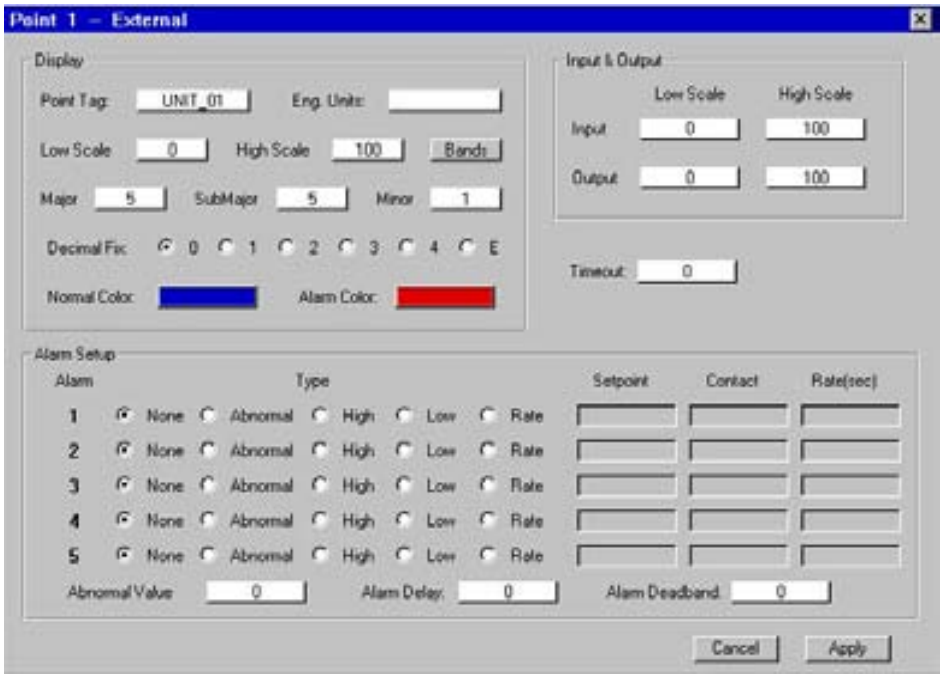

Figure 5–24. External type point programming

1. Display Block: Refer to the “Similar Programming Parameters” section for instructions.

2. Input & Output Block: Refer to step 4 in the Linear type point programming section.

3. Timeout: Timeout sets a maximum time period between data updates from the external source before flagging the point as invalid. The point is flagged as invalid if no update is received within the specified timeout period. Press **Timeout** and enter the timeout period in seconds. Press **OK**. Enter the timeout period as 0 if you want to disable this function.

4. Alarm Setup Block: Refer to the “Similar Programming Parameters” section for instructions.

SM100

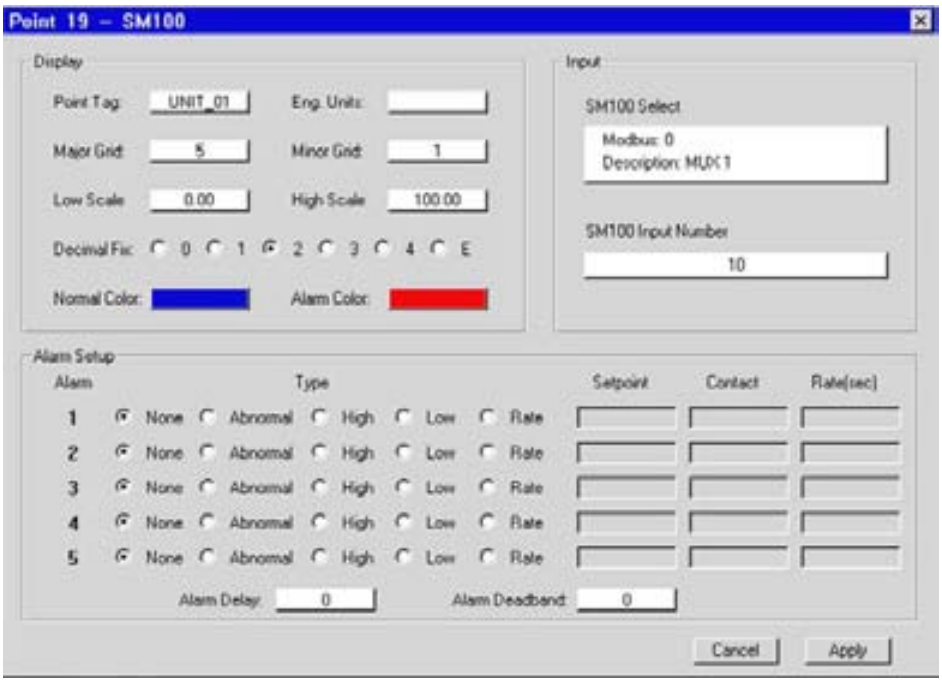

Figure 5–25. SM100 type point programming

1. Display Block: Refer to the "Similar Programming Parameters" section for instructions. **Note the following differences:**
   - Submajor grids: Not available.
   - Bands: Not available.

2. Input Block:
   a. SM100 Select: Press the correct Modbus button or the correct MUX description.
   b. SM100 Input Number: Enter the SM100 multiplexer relay to which this point is to be assigned.

3. Alarm Setup Block: Refer to the "Similar Programming Parameters" section for instructions. **Note that the Abnormal Value field is not available.**

Modbus

The Modbus type point is an optional feature enabled with the SM100 option and is a generic Modbus master interface. It may be used to periodically poll data from most Modbus compliant devices including other Thermo Scientific data acquisition products, PLCs, etc. Notes pertaining to the Modbus type point:

- Whenever possible, program Modbus point types for a particular slave in point numeric order. Doing so enables the instrument to poll the data from the slave in the most efficient manner.
- If a point goes abnormal (TCBO, overrange, overflow, invalid, etc.), the numeric data for the point is "jammed" to the programmed Abnormal Value (in the Alarm Setup section). This is useful in circumstances where the master polls data from the slave instrument and needs to alarm on an abnormal point condition in the slave. By setting the slave point Abnormal Value to a constant outside the dynamic range of the slaves' monitored process variable (for example, normal range = 0–3000 psi, abnormal value = -99999), the corresponding master Modbus point may be set to alarm on this value (Low alarm set point = -99999).
- Modbus RS485 permits only one master on the bus. Thus, point data from Modbus slaves that are multi-dropped on a single wire pair may only be polled by a single master. Alternatively, the instrument may function as both an Ethernet client and a server, allowing multiple instruments on a LAN to share point data.
- For the Modbus master, the data update rate for Modbus point types depends primarily on the number of slaves, the number of points per slave, and the physical transfer rate (RS485 baud rate or Ethernet 10/100 Mbit). The master begins a new Modbus slave scan cycle each second. Therefore, the maximum update rate is one second. At 19.2 Kbaud, serial Modbus slave point data is updated at approximately 16 points/second. On a 10-Mbit LAN, Ethernet Modbus slave point data is updated at approximately 21 points/second.
- If the physical connection to a slave is broken or if the slave stops responding to Modbus master polls, all associated Modbus master points are flagged as invalid. Once communications with the slave re-establishes, the master points "recover."

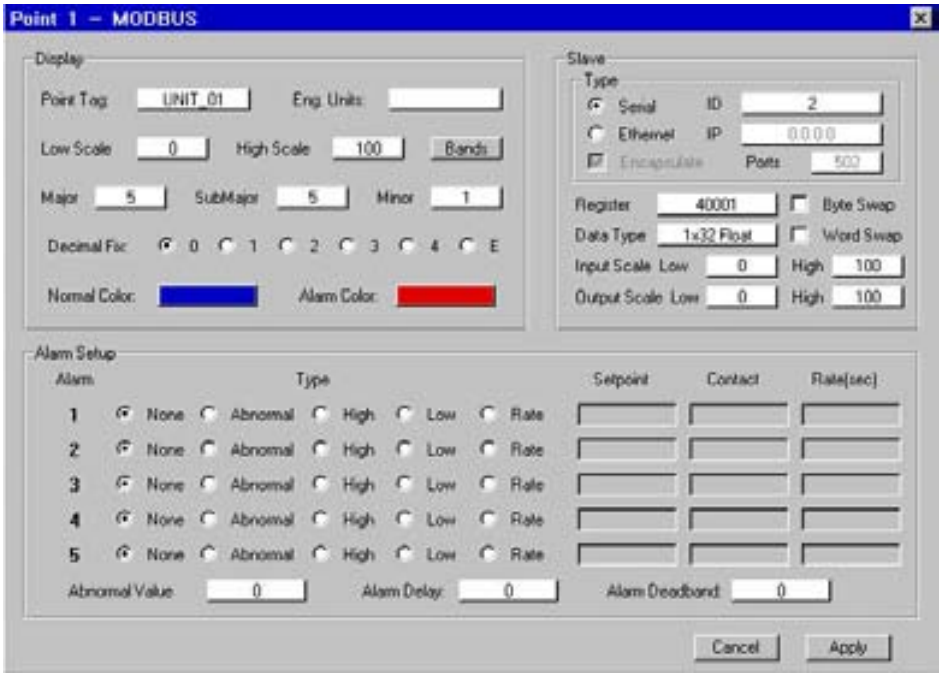

Figure 5–26. Modbus type point programming

1. Display Block: Refer to the “Similar Programming Parameters” section for instructions.

2. Slave Setup Block:

   a. Serial (RS485) or Ethernet communication interface.

      - If you select Serial, you must configure the serial port for Modbus master mode of operation and specify the Modbus slave ID address (1–255).
      - If you select Ethernet, you must specify the Modbus slave ID address and the slave’s IP address. You can also select from TCPIP encapsulated or non-encapsulated protocols and specify the port on which to make the connection (502 is default).

   b. Register: Modbus point types periodically poll the desired Modbus slave for data from the designated slave Modbus register. Modbus function codes supported include: Read Coil Status (register address 1nnnn), Read Input Status (2nnnn), Read Input (4nnnn), and Read Holding (3nnnn).

   c. Data Type: Data type defines the format of the numeric data stored in the slave register to be polled. Supported data types are listed below.

Table 5–4.

Data Type	Description
1 x 16 unsigned	For address 1nnnn, this type implies a single bit (coil or input) read. Data is conditioned by converting the bit value (0 or 1) to a float (0 or 1). For input and holding register reads (4nnnn and 3nnnn), this type implies a single 16-bit register. Data is conditioned by converting the 16-bit (positive) value to a float.
1 x 16 signed	Fetches a single 16-bit (15-bit plus sign) register. Data is conditioned by converting the 16-bit (signed) value to a float.
1 x 32 unsigned	Fetches a single 32-bit integer value register. Data is conditioned by converting the 32-bit (positive) value to a float.
1 x 32 signed	Fetches a single 32-bit integer value (31-bit plus sign) register. Data is conditioned by converting the 32-bit (signed) value to a float.
2 x 16 unsigned	Fetches value as two consecutive 16-bit registers and links them into a single 32-bit integer. Data is conditioned by converting the 32-bit (positive) value to a float.
2 x 16 signed	Fetches value as two consecutive 16-bit registers and links them into a single 32-bit integer. Data is conditioned by converting the 32-bit (31-bit plus sign) value to a float.
2 x 16 float	Fetches a 32-bit IEEE value as two consecutive 16-bit registers and links them into a single 32-bit float.
1 x 32 float	Fetches a single 32-bit IEEE formatted register.

d. Byte Swap and Word Swap: Data from the slave register is conditioned as required and becomes the IEEE float data for the associated Modbus point. Conditioning may consist of Big Endian/Little Endian (Byte Swap/Word Swap) data rearrangement and/or conversion from bit or integer data to IEEE floating point.

e. Input/Output Scales: Use these fields to rescale data before saving it in the point.

3. Alarm Setup Block: Refer to the “Similar Programming Parameters” section for instructions.

Store Boundary

The final function within the Point Programming screen is called Store Boundary. Refer to step 5 in "Media Control" of Chapter 4 for a detailed explanation of this function and the effect on data compression. Press the text box and enter the boundary value. Press **OK**.

Press **Program** to save the parameters you just set up.

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Chapter 6
Screen Types

Display Features

Following are descriptions of display features and which displays use them.

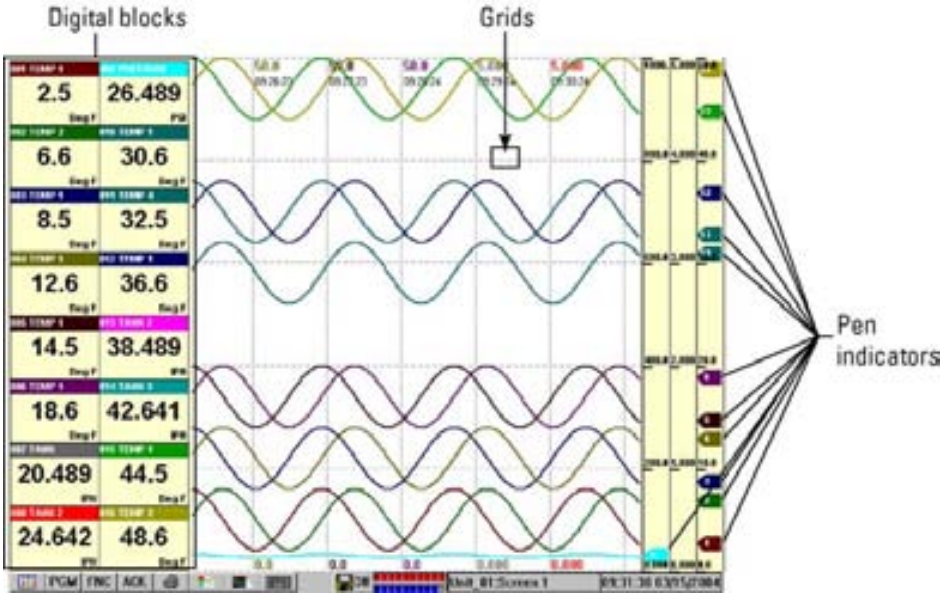

Figure 6–1.

Table 6–1.

Display Feature	Description
Digital blocks	May be displayed with the trend displays. Press the **Show** button to turn on and off. Displays current scaled data for the points.
Grids	Are both horizontal and vertical. If there is more than one scale set, they alternate. Each scale set has end points marked along top of the chart with the scale value.
Pen Indicators	Can be shown as bars or pointers. Scales can be turned on or off, allowing you to see indicators in the assigned scale. If more than one indicator has the same scale assigned to it, indicators are shown in same scale bar. If bars are being used and the scales are turned on, each bar is shown with its current scale.

Setup

Screens are selected by pressing the Screen button on the button bar. Each screen type is discussed in detail in the following sections. To set up a screen, go to the Program menu and select **Screens**. Determine the screen type desired and refer to the appropriate section in this chapter. Press **Close** to save the setup.

Note A password may be required to edit screen setups. Enter the correct password to unlock the protected items. Items that are password protected are unavailable unless the correct password is entered. ▲

Horizontal & Vertical Trend Screens

These screens emulate paper-type chart recorders with pens; they can show up to 32 of the points programmed and assigned to a group. Instructions on how to program the trend screens follow.

Figure 6–2. Horizontal Trend screen setup

1. Select one of the numbered screen buttons at the bottom of the screen. The selected number is assigned to this screen.

2. Select **Horizontal Trend** or **Vertical Trend** as the screen type.

3. Press the **Screen Name** text box, and a keyboard is displayed. Enter the title you want to give this screen, and press **OK**.

4. Press the **Point Group** text box and an input box appears. Enter the point group number (from 1–32) that you want to display, and press **OK**.

5. The Multi-Group Enable feature supports the setup of a trend screen and point groups that permit the operator to select exclusive process variables for display that are of particular interest at that time in the facility. By assigning names meaningful to existing facility processes to these groups, operators can easily select process variables of interest for presentation on the trend screen, suppressing the display of those variables not currently pertinent.

   As stated, up to the first 32 points assigned to the point group for a trend screen will be shown on the chart. Multi-Group Enable allows you to set up subgroups of points and selectively display any of the subgroups on a multi-group enabled trend screen. Refer to the example below.

   Example with Multi-Group enabled:

   Trend Screen Point Group = Group 1

   Group 1 = Points 1–16 assigned

   Group 2 = Points 1–4

   Group 3 = Points 5–8

   Group 4 = Points 9–12

   Group 5 = Points 12–16

   In this example, the trend screen would "normally" display trend lines and scales for Group 1. Touching the screen anywhere in the active chart area causes a Group Selection window to appear. From this window, you may select any of the subgroups for presentation. For instance, if you select Group 3, the trend display instantly changes to display only the trend lines and scales for Group 3 (points 5–8).

Note The point(s) assigned to the subgroups must be members of the main Point Group assigned to the trend screen. ▲

6. Press the **Background Color** box and a selection box appears. Select the desired screen background color (there are a total of 40 colors to select from), and press **OK**.

7. Press the **Grid Color** box and a selection box appears. Touch the desired color for the chart grid (total of 40 color options), and press **OK**.

8. Inside the Trend box:

   a. Touch the **Show Display Scale** check box to turn the scales on or off.

   b. Zoom Scale: As covered in Chapter 5, during point setup you can define a display scale with attributes such as end points, grid markings, and color boundaries. Typically, this scale will be displayed on a trend screen according to the point's setup. For example, a process variable input to the recorder is set up as a point (999) with a full range display scale of 0.0 to 10000. There are 10 major grid divisions, resulting in a major grid mark on the scale for each 1000 units. There are 10 submajor grid divisions, resulting in a submajor grid mark for each 100 units. Finally, there is 1 minor grid division, resulting in no marks. This display scale is shown on a "normal" (Zoom Scale not enabled) vertical trend display in Figure 6–3. Note that point 999 appears to be at about 1500 units on the scale.

Figure 6–3.

Assume that even though this process has a dynamic range of 10000 units, you want a finer resolution on the vertical trend scale. You can accomplish this by enabling the Zoom Scale feature. First, change the setup for point 999 by modifying the display scale to be 0 to 3000 with 3 major grids (1000 units each), 10 submajor grids (100 units each), and 5 minor grids (20 units each). Return to the trend setup screen and enable Zoom Scale with 3 majors. This display scale is shown on a "zoomed" vertical trend display in Figure 6–4. Now notice the finer resolution of this scale (20 units versus 100 units).

Figure 6–4.

In this example, the point's dynamic range is 10000 units, yet the scale encompasses only a fraction of that range. Thus, zoomed scales are designed to "slide". Point 999 will always be displayed near the center portion of the scale. As the point changes value, the scale will slide to accommodate. For instance, if point 999 were to go to 5240 units, the scale would look like Figure 6–5.

Figure 6–5.

Assume that you want to keep the resolution shown in Figure 6–5 but you want a display that is easier for an operator to interpret. To accomplish this, return to the setup screen for point 999. Keep the display scale set from 0 to 3000. However, set 6 major grid divisions (500 units), 5 submajor divisions (100 units), and 4 minor grid divisions (25 units). At the trend setup screen, enable Zoom Scale, and set 6 majors. If point 999 goes to 8425, the scale would look like Figure 6–6.

Figure 6–6.

In Figure 6–7, the Zoom Majors have been set back to 3, resulting in a magnification of the displayed scale (the scale now spans 1500 units across the full width of the display).

Figure 6–7.

As shown in these examples, the Zoom Scale function enables you to narrow or magnify a scale. This is useful when you need to enhance a portion of a large dynamic range input. Following are additional notes pertaining to this feature:

- For this release, only the lowest point number in the assigned group may be displayed on a zoomed trend screen.
- Zoomed scales are supported by linearly extrapolating from the ends of the display scale as defined during point programming.
- Centering the point on zoomed scales is accomplished by comparing the current center of the scale with the point value. If the difference becomes greater than one major grid division, the scale will slide, repositioning the point and trace towards the center of the scale.

c. Select the type of pen indicator. All pens displayed will have the same type of indicator.

d. Select one of the three available trace widths, or enter a custom width from 4 to 20 pixels.

9. Select the review background color and the review grid color in the same manner as you selected the normal background and grid colors (steps 6–7).

10. Set low and high chart speeds by pressing left and right arrow buttons to decrease and increase speeds. The single arrow keys adjust the chart speeds in small increments, and the double arrow keys adjust the chart speeds in larger amounts.

11. Zone Mode: Review the following information to determine whether your application requires enabling this feature.

    a. ID Interval (inch/hour): The ID is the process of identifying trend lines by periodically placing the point number next to the actual vertical trace displayed on the trend screen. Essentially, this function controls how much vertical distance the trend line advances on the chart before the recorder identifies the trace again.

    b. Low End (%), High End (%): This section enables you to program the low and high ends of the zone. Both zone end points are set to 0% by default. Enabling the Zone Mode function and leaving the end points set to 0% results in the recorder identifying all traces assigned to the display at each programmed interval. However, setting the end points to other percentages establishes a physical boundary across the chart width. In this scenario, the recorder identifies traces only outside the boundary. The recorder identifies these traces according to the programmed interval as long as they remain outside the boundary. For example, setting the low end point at 40% and the high end point at 60% results in the chart displayed in Figure 6–8. Notice the zone boundary designated by the vertical bands.

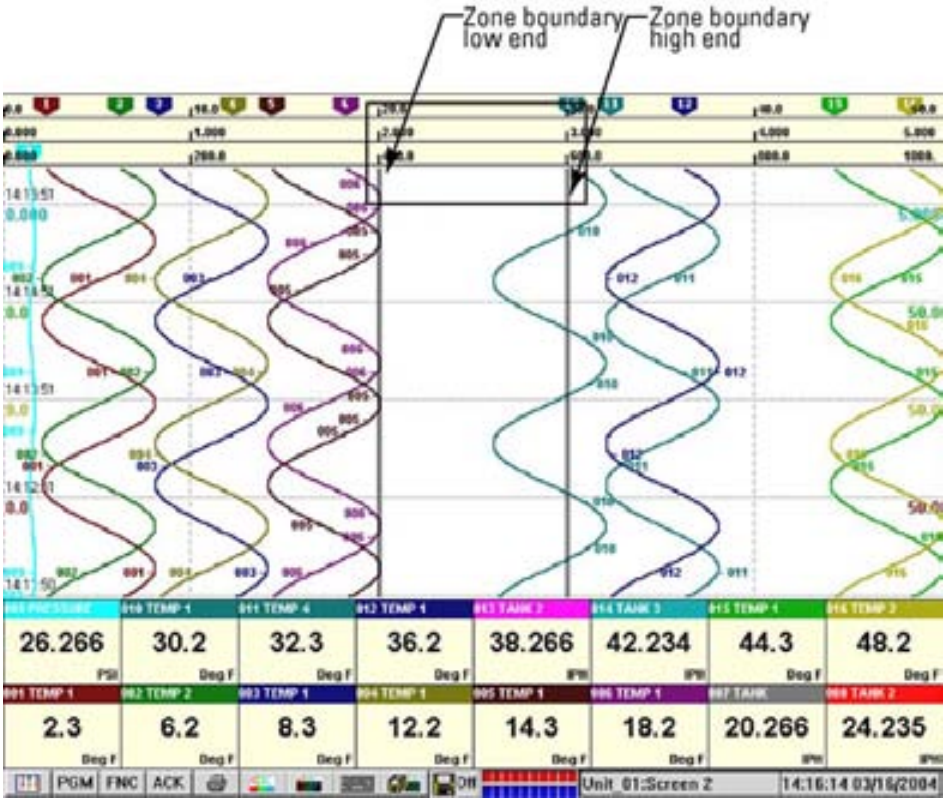

Figure 6–8. Zone boundaries on a typical vertical trend screen

Circular Trend Screen

The circular trend screen displays data in a circular chart format.

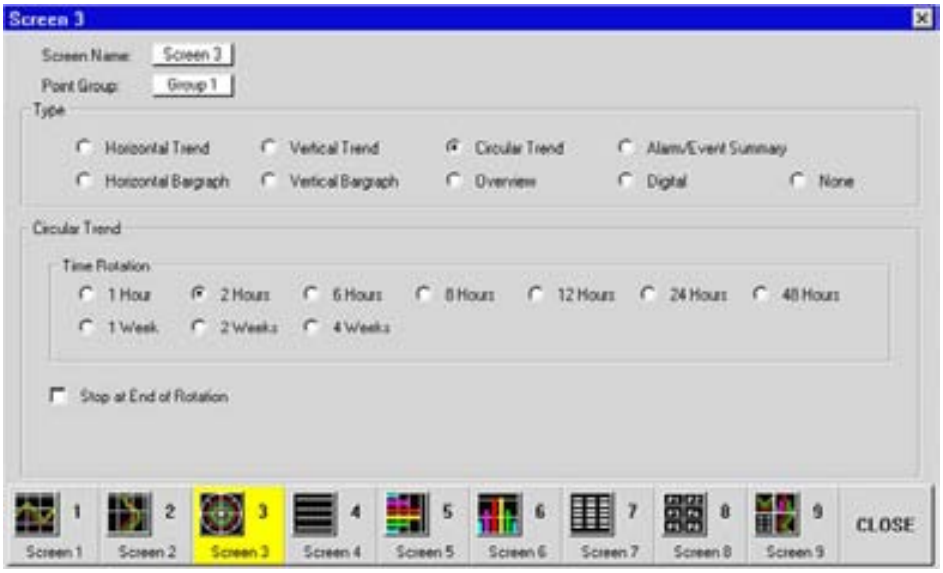

Figure 6–9. Circular Trend screen setup

1. Complete steps 1–4 from "Horizontal & Vertical Trend Screens". Select **Circular Trend** as the screen type in step 2.

2. Determine the period of time you want the chart to display: 1 hour, 2 hours, 6 hours, 12 hours, 24 hours, 48 hours, 1 week, 2 weeks, or 4 weeks. Press the desired time frame within the Time Rotation section. If you do not want the recorder to restart at the end of the time period, press **Stop at End of Rotation**. You can reset the trend screen by pressing **CLR/RST** (Figure 6–10).

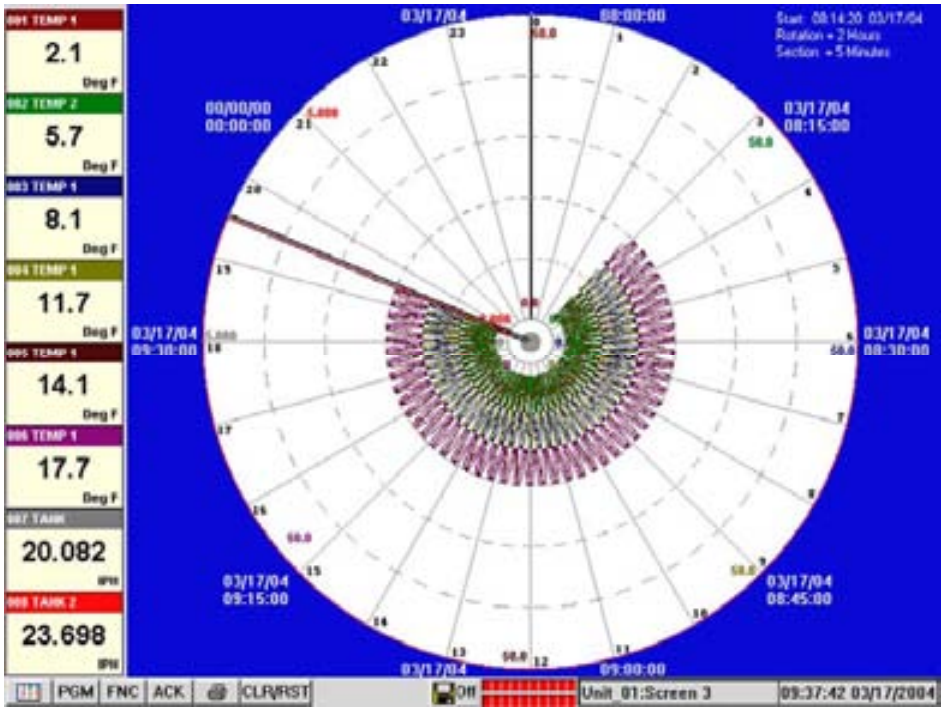

Figure 6–10. Typical Circular Trend screen

Alarms/Events Summary Screen

The alarm/event screen displays:

- Changes in point alarm status: Points currently in alarm are displayed in red. Alarms that have already been cleared or are out of alarm are displayed in green.
- Point resets: Points that may be reset, such as totalizers, are displayed with the actual value at the time of reset. Some point types such as HI PEAK may have two entries. The first entry is the date and time that the high peak occurred, with the peak value. The second entry, above it, is the actual time the reset occurred, along with the value at that time.
- Power ON/OFF: The date and time of the unit power on/off is displayed.

- Changes in event switch status, such as an input contact closure (event).

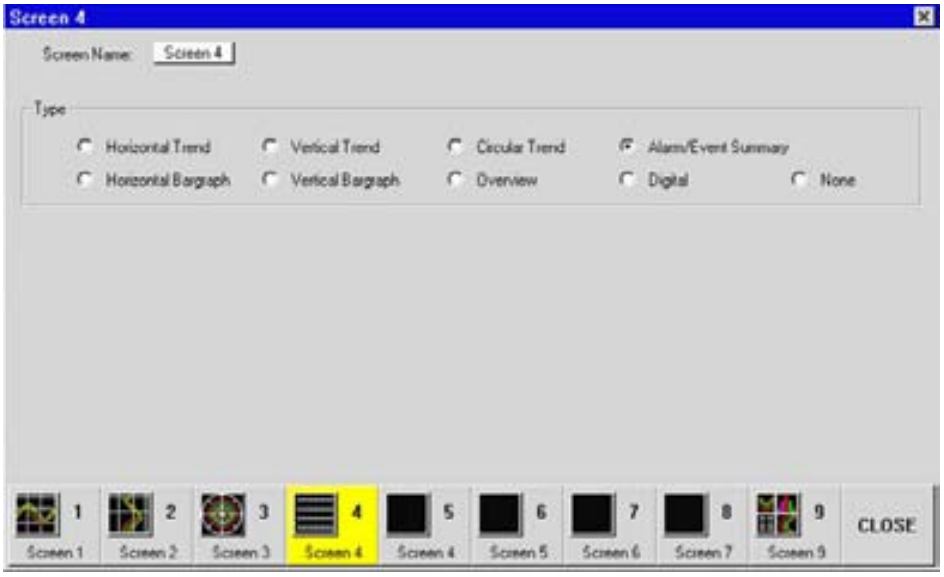

Figure 6–11. Alarm/Events Summary screen setup

Complete steps 1–2 from "Horizontal & Vertical Trend Screens." Be sure to select **Alarms/Events Summary** as the screen type in step 2.

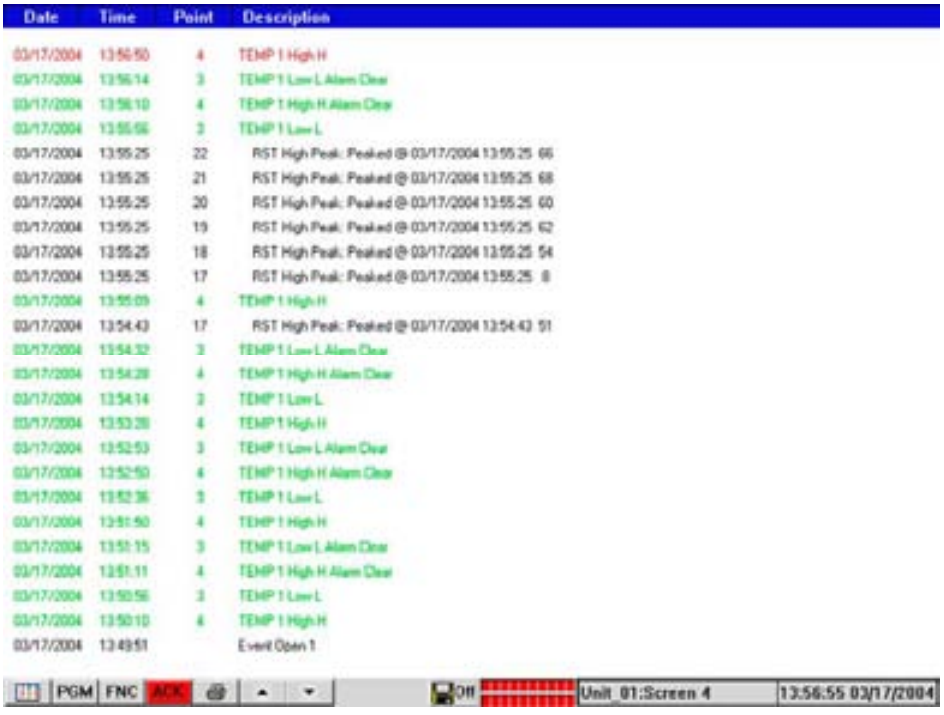

Figure 6–12. Typical Alarm/Events Summary screen

Horizontal & Vertical Bargraph Screens

Instructions on how to program the bargraph screens are identical.

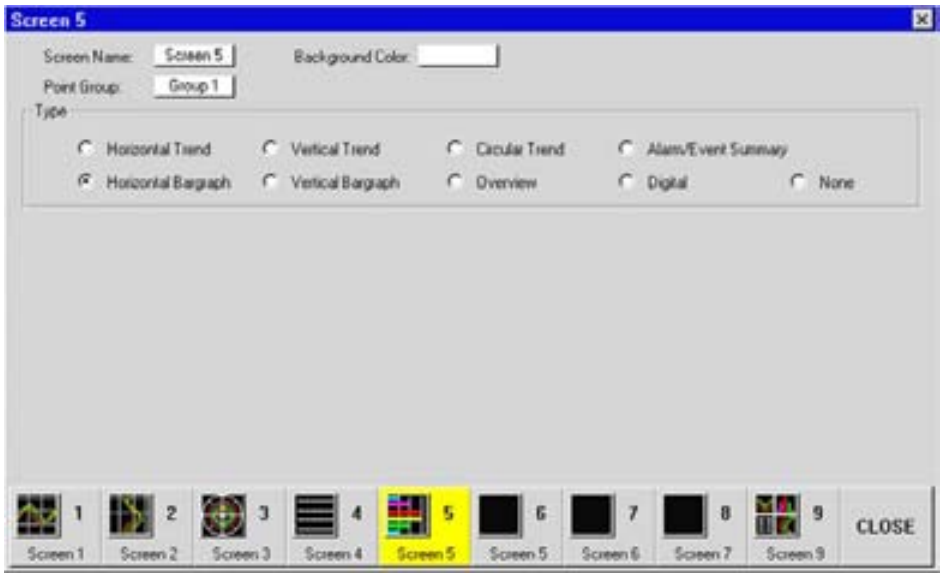

Figure 6–13. Horizontal Bargraph screen setup

1. Complete steps 1–4 from "Horizontal & Vertical Trend Screens." Select **Horizontal** or **Vertical Bargraph** as the screen type in step 2.

2. Press the **Background Color** box and a selection box appears. Select the desired screen background color, and press **OK**.

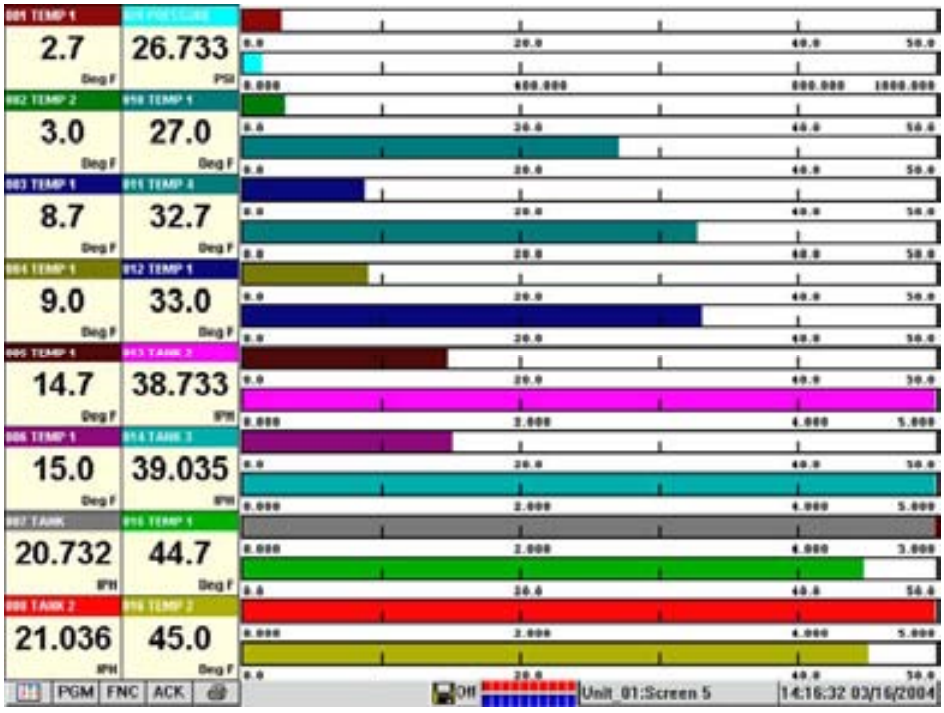

Figure 6–14. Typical Horizontal Bargraph screen

Overview Screen

The overview screen displays up to 80 points in a digital block format, allowing you to quickly survey a range of points in the recorder. If more than 80 points are programmed, touch the Next button on the button bar to display the rest of the points. In the second display, Next becomes Back; press it to return to the first page.

Figure 6–15. Overview screen setup

1. Complete steps 1–3 from "Horizontal & Vertical Trend Screen." Select **Overview** as the screen type in step 2.

2. Press the **Background Color** box and a selection box appears. Touch the desired color for the background, and press **OK**.

3. Press the **Digital Color** box and a selection box appears. Touch the desired color for the chart grid, and press **OK**.

Figure 6–16. Typical Overview screen

Digital Screen

Digital blocks may be shown for a maximum of 32 programmed points. The large numbers in the center of the window are the real-time point value, and above the point value is the point tag. Below the point value is the selected engineering unit.

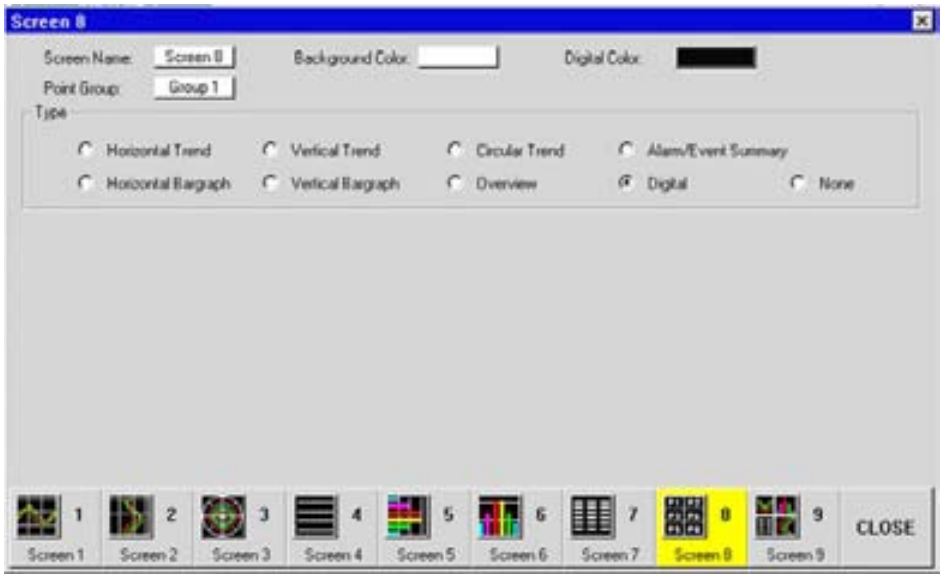

Figure 6–17. Digital screen setup

1. Complete steps 1–4 from "Horizontal & Vertical Trend Screens." Be sure to select **Digital** as the screen type in step 2.

2. Press the **Background Color** box and a selection box appears. Select the desired screen background color, and press **OK**.

3. Press the **Digital Color** box and a selection box appears. Touch the desired color for the chart grid, and press **OK**.

Figure 6–18. Typical Digital screen

None Screen

Select this type of screen to delete or clear a previously programmed screen.

Complete steps 1–3 from "Horizontal & Vertical Trend Screens." Be sure to select **None** as the screen type in step 2.

Combo Screen

This screen type allows you to see four of your other programmed screens on one screen.

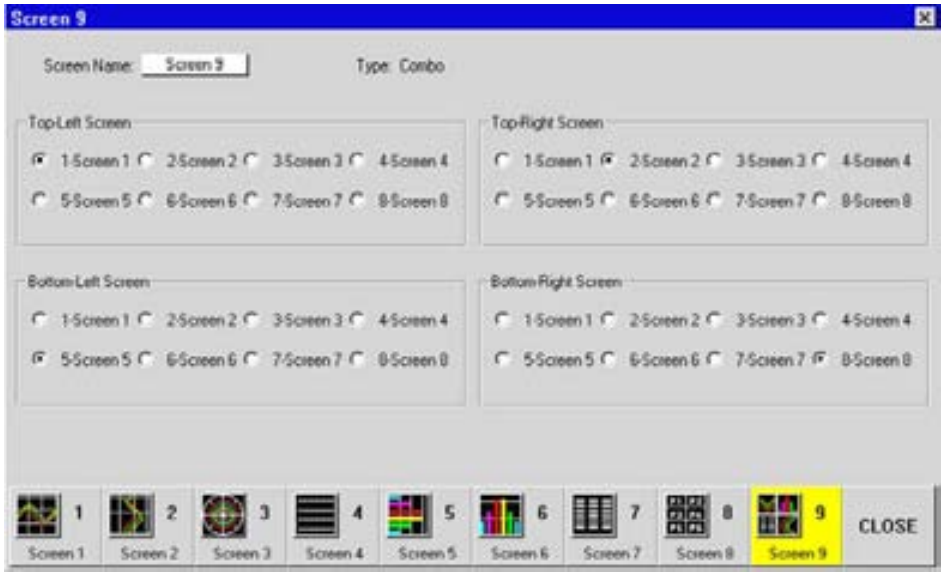

Figure 6–19. Combo screen setup

1. Select the screens by touching a screen name.

2. Press the text box to the right of Screen Name and a keyboard is displayed. Enter the title you want to give this screen, and press **OK**.

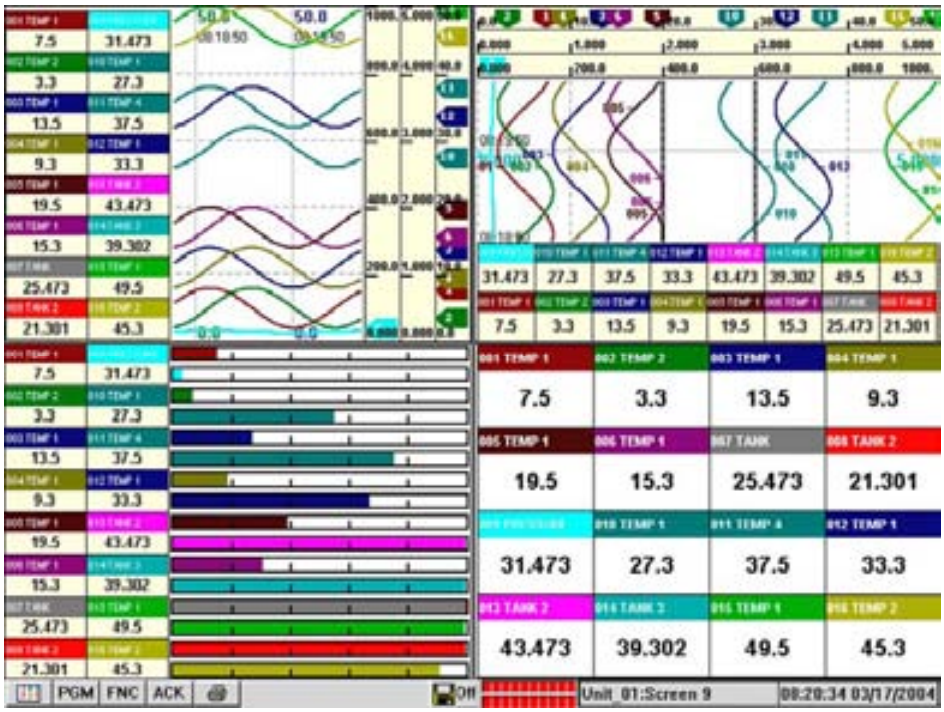

Figure 6–20. Typical Combo screen

Reviewing Recorder Memory

You can review data stored in the recorder's memory from any display with the Review button showing on the button bar. During review, you may turn digital blocks on or off. A small portion of the real time data is visible at the top on vertical screens or at the right on horizontal screens. Figure 6–21 depicts a horizontal trend display with Review turned on and describes the functions on the button bar.

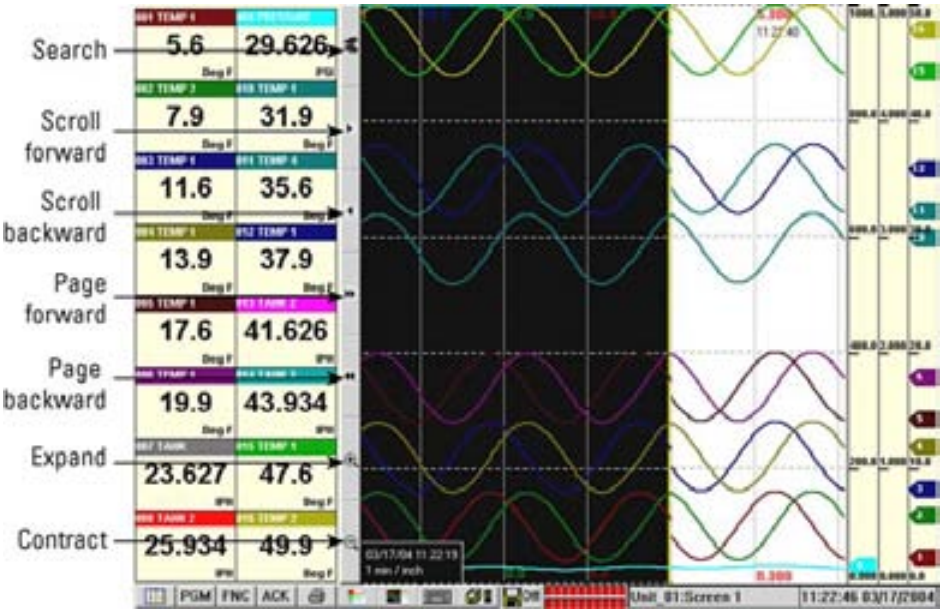

Figure 6–21.

Table 6–2.

Button	Function
Search	Press this button and a new window pops up. Select whether the search should be by time and date, by time only, or by alarm. An input box then opens. Enter/select the required information, and press **Search**.
Scroll Forward	Press this button to move the display forward in time at the rate shown on the screen.
Scroll Backward	Press this button to move the display backward in time at the rate shown on the screen.
Page Forward	Press this button to move an entire screen forward in time.
Page Backward	Press this button to move an entire screen backward in time.
Expand	Pressing this button allows you to expand the view so that less time is displayed. The minimum amount of time that may be displayed is 5 sec./in.
Contract	Pressing this button allows you to decrease the view so that more time is displayed. The maximum amount of time that may be displayed is 2 hr./in.

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Chapter 7
Setting up Communications

This chapter addresses the Ports menu item.

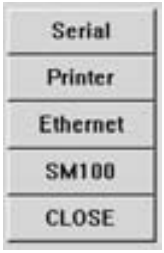

Figure 7–1. Ports menu

Serial Communications

1. Select Program > Ports > **Serial.**

2. Press **Modbus ID** and enter the recorder's (Modbus slave) ID number. This number can be from 1 to 255 for use in your communications system. The communications system must have a matching ID number to communicate with the recorder.

Figure 7–2.

RS232 Serial Port

The RS232 interface allows a recorder to communicate with a computer at a distance of up to 50 feet (16 m). The RS232 port may be used for distances in excess of 50 feet as long as special low capacitance cables are used. The maximum load capacitance is 2500 ρF.

1. From the RS232 Block on the Serial Ports screen, set up the following items as necessary for your communications system:
   a. Protocol: RTU (Modbus) or ASCII
   b. Float Format: 1 x 32 or 2 x 16
   c. Baud Rate: 1200 to 38400
   d. Bits/Character: 7 or 8
   e. Parity: None, Odd, or Even
   f. Stop Bits: 1 or 2
2. Press **Close**.

RS485 Serial Port

The RS485 interface allows a recorder to communicate with a computer up to a maximum of 4000 feet (1300 m). The RS485 interface supports up to 31 recorders linked to a single computer. Each recorder is identified by a unique unit address (Modbus ID).

1. From the RS485 Block on the Serial Ports screen, set up the following items as necessary for your communications system:
   a. Protocol: RTU (Modbus) or ASCII
   b. Float Format: 1 x 32 or 2 x 16
   c. Baud Rate: 1200 to 38400
   d. Bits/Character: 7 or 8
   e. Parity: None, Odd, or Even
   f. Stop Bits: 1 or 2
2. Press **Close**.

Parallel Printer Port

The parallel printer port is configured to communicate with a standard HP color inkjet printer. Setup for other printers is not available.

Ethernet Port

The instrument implements 10/100 Base-T, TCP/IP protocols via a CAT5 cable on Local Area Networks (LANs). There are four Ethernet functions supported by the instrument. Following are descriptions of each function and instructions on setting up the Ethernet port.

- Acting as a web server: By using almost any PC-based web browser (Microsoft® Internet Explorer, Netscape/Mozilla, Firefox, etc.), you can view real-time data and instrument status at any time. The browser display is in tabular/text form only.
- Acting as a Modbus slave device: The instrument can also act as a TCP/IP encapsulated Modbus slave device. As a Modbus slave, the instrument can be controlled via Ethernet by a host Modbus master. The master can send data and/or commands to the instrument(s) over the LAN. Using a suitable program, a master can periodically pull monitored process variable data from the recorder in real time and archive it for later analysis. Another example of this function is when a plant computer acts as a Modbus master and periodically sends process data gathered from another source to the instrument for local display and recording.
- Acting as an FTP server: By using a suitable FTP client program, a host computer can connect to any instrument on the network and selectively extract historical day-files directly from the instrument's recording media (PC card, Flash card, or floppy disk). This extraction can also be done in real time without affecting current recorder operations (measure, record, display). When the instrument is acting as an FTP server, you can fetch its configuration file (INI file) via the LAN. Alternatively, you can send a configuration file to an instrument via the LAN in order to reprogram it. Upon receipt of the file, the instrument loads the new configuration and resets. Depending on the size and complexity of the new configuration, it can take up to 40 seconds for the instrument to reset.
- Acting as an FTP client: The recorder also supports remote FTP servers over the LAN by acting as an FTP client. In this case, you can configure the instrument to automatically send all recorded data (stored as day-files on the local recorder media) periodically to the host FTP server. For added redundancy and data security, you can specify two FTP servers to automatically receive the data. Depending on configuration, the recorder will either transfer data to both servers or will go to the secondary server only if a transfer to the primary server fails.

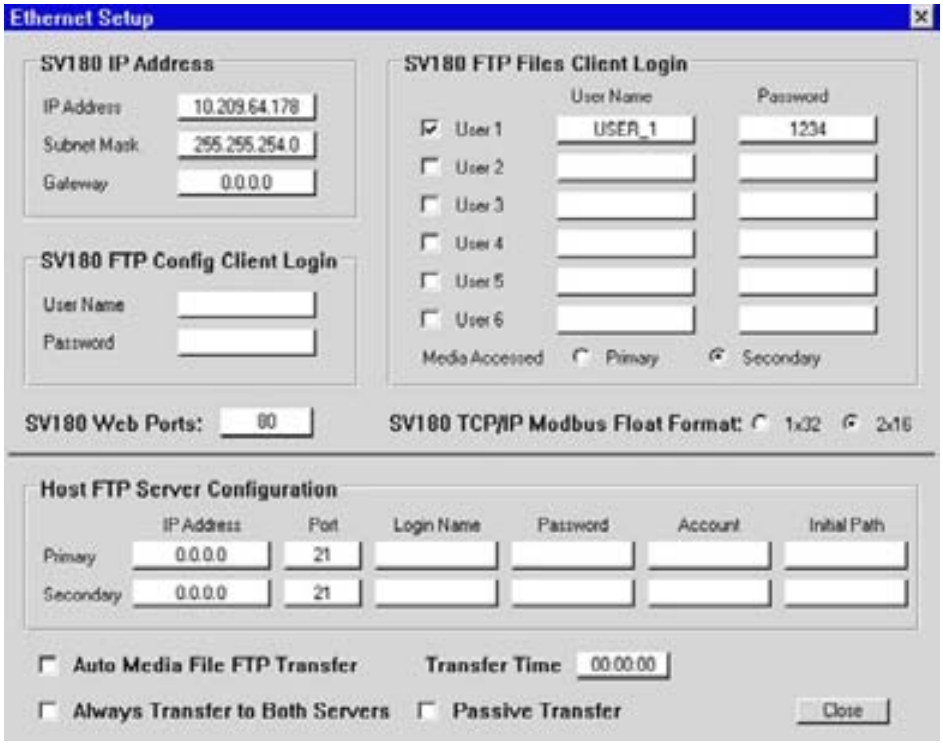

Figure 7–3.

1. SV180 IP Address Block:
    a. The IP address distinguishes between the various devices connected to the network when using TCP/IP protocol to communicate. The address is a 32-bit value normally expressed with four values (0 to 255) separated by a period (192.168.100.15, for example). The default setting is 0.0.0.0. The IP address must be set.
    b. Subnet Mask: The subnet mask determines the network address from the IP address. The address is a 32-bit value normally expressed with four values (0 to 255) separated by a period (255.255.255.0, for example). The default setting is 0.0.0.0. Set this value according to the system or the network to which the recorder belongs. In some cases this setting may not be needed.
    c. Default Gateway: This is the IP address that is used when communicating with other devices on a different network. The address is a 32-bit value normally expressed with four values (0 to 255) separated by a period. The default setting is 0.0.0.0. Set this value according to the system or the network to which the recorder belongs. In some cases this setting may not be needed.

2. SV180 FTP Config Client Login Block: You can set up the recorder to accept INI (configuration) files from a host computer. This section allows you to safeguard this feature by entering the user name with a password. Press the boxes for each to enter text. Note that the FTP Config port is internally fixed at 50000; you must use this port when connecting the recorder to transfer an INI file.

3. SV180 FTP Files Client Login Block: Accessing the recorder's data/alarm event files requires a user name and password. This section of the screen allows you to set up a maximum of six user names and corresponding passwords.

   a. Press the check box next to User (1, 2, 3, etc.).

   b. Press the **User Name** text box, enter the name, and press **OK**.

   c. Press the **Password** check box, enter the user's password, and press **OK**.

   d. Select **Primary** and/or **Secondary** as the media the user is allowed to access.

4. SV180 Web Ports: The default port (end point) for web services is 80. For example, if the port is set to 80, enter "http://10.209.64.137:80" in the browser address field. The web server port can be set to any port from 1 through 65535.

5. TCP/Modbus Floating Point Format: Select the type of Modbus floating point format that the recorder's communications uses: 1 x 32 float format maps the point data into a single 32-bit register while the 2 x 16 float format maps the point data into 2 consecutive 16-bit registers. This setting should match your host communications protocol dealing with floating point values. Select the float format by pressing the appropriate button.

6. Host FTP Server Configuration Block: This section allows you to set up the recorder to access a server. You can set the recorder to automatically transfer data and alarm/event files to a predetermined place on the primary server. If the primary server is down, the recorder attempts to transfer the files to the secondary server, if one is programmed.

    a. IP Address: Enter the server's IP address. The entry must match the server's IP address exactly, including the periods between number sets.

    b. Port: Set the server port number that the recorder will use when communicating with the FTP server. This field is typically 21.

    c. Login Name and Password: Enter the name and password the recorder should use to access the server.

    d. Account: An account may be set up in the server for the recorder. This entry must match that account number. Press the text box and enter the account number.

    e. Initial Path: Enter the initial directory path on the user's server to which the recorder will transfer files.

    f. PASV Mode:

    - Yes: The recorder establishes a control connection to the FTP server and waits for the server to make the data connection. Data transfer then begins.
    - No: The recorder establishes a control connection to the FTP server and waits for the server to issue a port number. The recorder then establishes a data connection to the port and data transfer begins.

    g. Check the Auto Media File FTP Transfer check box, and enter the time transfer should occur by pressing the Transfer Time text box. Enter the transfer time (programmable in whole hours only). Press **OK**.

    h. Check the Always Transfer to Both Servers check box to cause the unit to transfer the same data to both FTP servers at the specified time of day. If the box is not checked, the unit attempts to transfer to the primary FTP server first. If this fails, it then attempts to transfer to the secondary FTP server.

7. Press **Close** when setup is complete.

SM100 Master Support for Multibank Systems

This option is accessible for units operating as multibank units. Each unit can have up to 20 SM100s attached. If serial communications are used, the SM100 Setup, as shown in Figure 7–4, allows you to change the SM100 unit IDs. If the SM100s contain the Ethernet option, the setup screen allows you to set up the communications by entering the IP address for each SM100. You can also change the multiplexer's unique description.

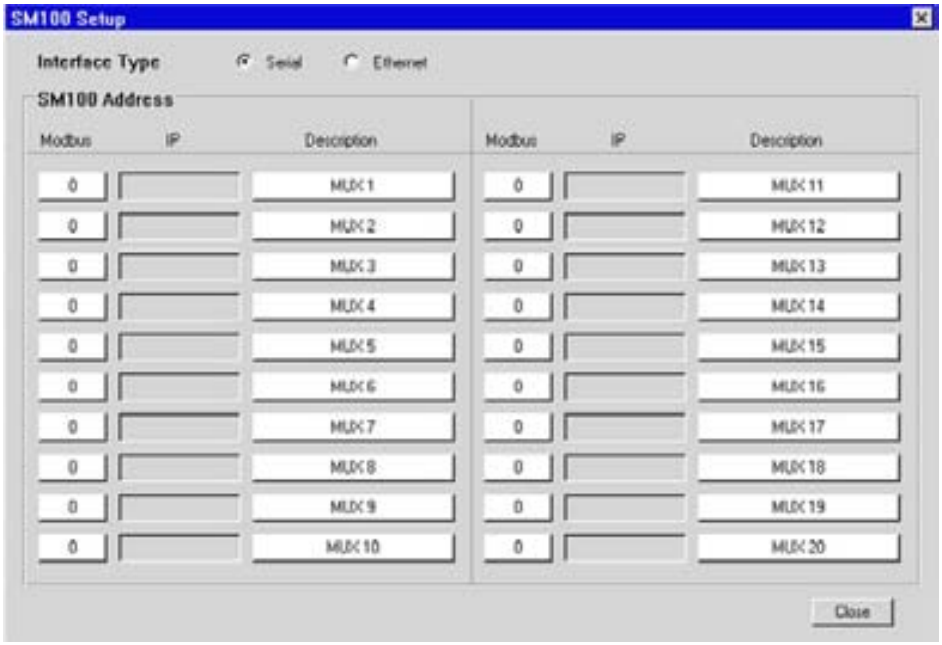

Figure 7–4.

Modbus RTU & ASCII Functions

The instrument supports a subset of the Modbus protocol RTU and ASCII. These functions include:

Table 7–1.

Function #	Description	Function #	Description
1	Read Coil Status	5	Force Single Coil
2	Read Input Status	6	Preset Single Register
3	Read Holding Registers	15	Force Multiple Coils
4	Read Input Registers	16	Preset Multiple Registers

Note that some registers are reserved or are not used. Use the defined registers only.

Modbus Floating Point Formats

The registers most users will be interested in are the Point 1 through Point 999 Data Registers. These registers hold the current floating point value for each data point. The original Modbus specification has no mention of floating point numbers. Therefore, several methods of transferring floating point numbers have emerged. Thermo Fisher supports two of these methods. One is compatible with the Modicon 984 PLC and the other is referred to as the Daniel's Extension. IEEE floating point number requires 4 bytes (2 words). From the original specifications, Modbus registers are all 2 bytes (1 word).

Sign Bit	Exponent	Mantissa		
	(+127 biased)	(extra implied 1 bit)		
1 bit	8 bits	23 bits		
SEEEEEEE	EMMMMMMM	MMMMMMMM	MMMMMMMM	
Byte 0	Byte 1	Byte 2	Byte 3	
High Word		Low Word		

Modicon 984 PLC Compatible Format

This is a 2 x 16 format (2 consecutive register addresses for one floating point number). The two words MUST always be accessed together to ensure valid values.

Register 1	Low Word
Register 2	High Word

Daniel's Extension

This is a 1 x 32 format (1 register for one floating point number).

Register 1	Byte 0, Byte 1, Byte 2, Byte 3

Modbus Registers

The following tables show the mapping of the recorder parameters into Modbus registers. Knowledge of these Modbus register assignments is only needed if utilizing third-party communication software.

Note The registers flagged as "Reserved" are intended for ProView Plus software only and should not be used with any other software. ▲

Table 7–2. Coil Registers 0XXX

POINT ACTIVE BYPASSED STATUS
Data Type: Bit
Functions: 1, 15
Read/Write

Coil #	Function and State	Coil #	Function and State
0001	POINT 1	·	
0002	POINT 2	·	
0003	POINT 3	·	
0004	POINT 4	0999	POINT 999

INDEX: ACTIVEBYPASSCOILNUMBER = POINTNUMBER

Table 7–3. Coil Registers 1XXX

POINT RESET CONTROL
Data Type: Bit
Functions: 1, 15
Read/Write

Coil #	Function and State	Coil #	Function and State
1001	POINT 1 DEMAND RESET	·	
1002	POINT 2 DEMAND RESET	·	
1003	POINT 3 DEMAND RESET	·	
1004	POINT 4 DEMAND RESET	1999	POINT 999 DEMAND RESET

INDEX: POINTRESETCOILNUMBER = POINT NUMBER + 1000

Table 7–4. Coil Registers 2XXX

EVENT SWITCH MESSAGES
Data Type: Bit
Functions: 1, 15
Read/Write

Coil #	Function and State	Coil #	Function and State
2001	TRIGGER EVENT 01 OPEN MESSAGE	·	
2002	TRIGGER EVENT 01 CLOSE MESSAGE	·	
2003	TRIGGER EVENT 02 OPEN MESSAGE	2119	TRIGGER EVENT 60 OPEN MESSAGE
2004	TRIGGER EVENT 02 CLOSE MESSAGE	2120	TRIGGER EVENT 60 CLOSE MESSAGE

OPENMESSAGECOILNUMBER = (EVENTNUMBER * 2) + 1999 CLOSEMESSAGECOILNUMBER = (EVENTNUMBER * 2) + 2000

Table 7–5. Coil Registers 4XXX

SPECIAL PURPOSE
Data Type: Bit
Functions: 1, 15
Read/Write

Coil #	Function and State	Coil #	Function and State
4001	ACKNOWLEDGE ALARMS	4007	SIMULATOR FREEZE
4002	ALARM CHECKS ENABLE/DISABLE	4008	SIMULATOR CLEAR
4003	CHART SPEED HI/LO	4009	HIGH DISPLAY INTENSITY CHANGE
4004	RESERVED	4010	LOW DISPLAY INTENSITY CHANGE
4005	RESERVED	4011	SET DATE AND TIME
4006	HISTORY RECORDING ON/OFF	4012	CAPTURE SCREEN TO BITMAP IMAGE FILE ON SECONDARY MEDIA

Table 7–6. Coil Register 0XXX

INPUT FLAGS
Data Type: Bit
Functions: 2
Read Only

Coil #	Function and State	Coil #	Function and State
0001	ANY ALARMS CURRENTLY PRESENT		

Table 7–7. 16-Bit Input and Holding Registers 0XXX

POINT DATA
Data Type: IEEE 754 Floating Point
Functions: 3, 4, 16
Read/Write

Register #	Function and State	Register #	Function and State
0001	POINT 1 DATA	.	
0002		.	
0003	POINT 2 DATA	1997	POINT 999 DATA
0004		1998	
0005	POINT 3 DATA		

INDEX: POINTNUMBERFLOAT (POINTNUMBER * 2) – 1

Table 7–8. 16-Bit Input and Holding Registers 2XXX

HIGH/LOW DISPLAY SCALES DATA
Data Type: IEEE 754 Floating Point
Functions: 3, 4, 16
Read/Write

Register #	Function and State	Register #	Function and State
2001	POINT 1 DISPLAY SCALE LOW END	.	
2002		.	
2003	POINT 1 DISPLAY SCALE HIGH END	5993	POINT 999 DISPLAY SCALE LOW END
2004		5994	
2005	POINT 2 DISPLAY SCALE LOW END	5995	POINT 999 DISPLAY SCALE HIGH END
2006		5996	
2007	POINT 2 DISPLAY SCALE HIGH END		

INDEX: POINTDISPLAYSCALELOWEND = (POINTNUMBER * 4) + 1997 POINTDISPLAYSCALEHIGHEND = (POINTNUMBER * 4) +1999

Table 7–9. 16-Bit Input and Holding Registers 6XXX

USER CONSTANTS
Data Type: IEEE 754 Floating Point
Functions: 3, 4, 16
Read/Write

Register #	Function and State	Register #	Function and State
6001	USER CONSTANT 1	.	
6002		.	
6003	USER CONSTANT 2	6127	USER CONSTANT 64
6004		6128	
6005	USER CONSTANT 3		

INDEX: USERCONSTANT = (CONSTANTNUMBER * 2) + 5999

Table 7–10. 16-Bit Input and Holding Registers 75XX

EVENT SWITCH MESSAGES
Data Type: ASCII
Functions: 3, 4, 16
Read/Write

Register #	Function and State	Register #	Function and State
7501-7510	EVENT SWITCH 1 OPEN MESSAGE	.	
7511-7520	EVENT SWITCH 1 CLOSE MESSAGE	8681-8690	EVENT SWITCH 60 OPEN MESSAGE
7521-7530	EVENT SWITCH 2 OPEN MESSAGE	8691-8700	EVENT SWITCH 60 CLOSE MESSAGE
.			

INDEX: EVENTNUMBEROPENMESSAGE = (EVENTNUMBER * 20) + 7481 EVENTNUMBERCLOSEMESSAGE = (EVENTNUMBER * 20) + 7491

Table 7–11. 16-Bit Input and Holding Registers 95XX

DATE AND TIME
Data Type: Integer
Functions: 3, 4, 16
Read/Write

Register #	Function and State	Register #	Function and State
9501	YEAR	9504	HOUR
9502	MONTH	9505	MINUTE
9503	DAY	9506	SECOND

Table 7–12. 32-Bit Input and Holding Registers 0XXX

POINT DATA
Data Type: IEEE 754 Floating Point
Functions: 3, 4, 16
Read/Write

Register #	Function and State	Register #	Function and State
0001	POINT 1 DATA	.	
0002	POINT 2 DATA	.	
0003	POINT 3 DATA	0999	POINT 999 DATA

INDEX: POINTNUMBERFLOAT = POINTNUMBER

Table 7–13. 32-Bit Input and Holding Registers 1XXX

HIGH/LOW DISPLAY SCALES DATA
Data Type: IEEE 754 Floating Point
Functions: 3, 4, 16
Read/Write

Register #	Function and State	Register #	Function and State
1001	POINT 1 DISPLAY SCALE LOW END	·	
1002	POINT 1 DISPLAY SCALE HIGH END	·	
1003	POINT 2 DISPLAY SCALE LOW END	2997	POINT 999 DISPLAY SCALE LOW END
1004	POINT 2 DISPLAY SCALE HIGH END	2998	POINT 999 DISPLAY SCALE HIGH END

INDEX: POINTDISPLAYSCALELOWEND = (POINTNUMBER * 2) + 999 POINTDISPLAYSCALEHIGHEND = (POINTNUMBER * 2) + 1000

Table 7–14. 32-Bit Input and Holding Registers 3XXX

USER CONSTANTS
Data Type: IEEE 754 Floating Point
Functions: 3, 4, 16
Read/Write

Register #	Function and State	Register #	Function and State
3001	USER CONSTANT 1	·	
3002	USER CONSTANT 2	·	
3003	USER CONSTANT 3	3064	USER CONSTANT 64

INDEX: USERCONSTANT = CONSTANTNUMBER + 3000

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Chapter 8
Calibration

Caution Do not attempt to perform calibration until you are fully prepared to do so. Following incorrect procedures can destroy instrument calibration. Read this entire chapter before attempting to calibrate the unit. ▲

Note Allow the recorder to warm up and stabilize (approximately 15 minutes at room temperature) prior to performing calibration. ▲

General

Routine calibration should be performed to maintain the accuracy of your instrument. Routine calibration consists of calibrating each of the ADC gain ranges and the precision current sources (if RTD option present).

You will need the following to calibrate your instrument: One precision voltage source (accurate to ±2 microvolts), adjustable from 10 mV to 10 V.

Scale Calibration Overview

The recorder menu supports full calibration for your instrument's voltage and current ranges. Each range requires unique calibration constants which are automatically calculated during the calibration of each range. The recorder can calibrate all installed inputs cards simultaneously. The Calibrate ADC screen (Figure 8–1) will show the exact location to connect the voltage source.

Note that actual voltage calibration constants are automatically stored in nonvolatile memory on the analog to digital converter boards.

Procedure

1. Connect the precision voltage source to the positive (+) and negative (-) calibration inputs. For multibank units, other calibration connection options exist. Refer to Figures 2–28 and 2–29. Verify correct polarity.

2. Turn on the voltage source and allow it to stabilize.

3. From the Program menu, select **Measurement**.

4. Press **Calibrate ADC** to access the calibration screen.

Note If your recorder is not multibank compatible, the first column in the Calibrate ADC screen will display data for slot 1, points 1–16. ▲

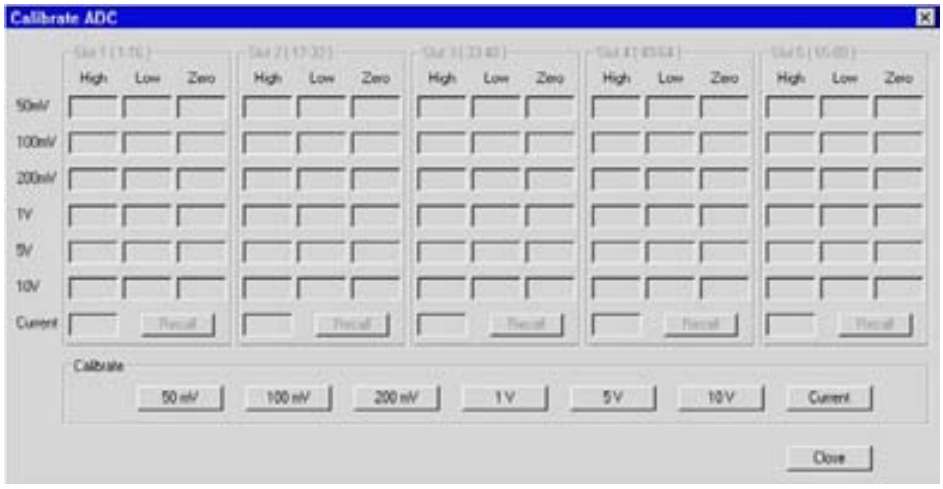

Figure 8–1.

5. Select the range to calibrate (50 mV, 100 mV, 200 mV, 1 V, 5 V, 10 V).

Note The remaining steps use the 50 mV range; however, these steps are the same regardless of the range you select. ▲

6. A known good -50 and +50 mV (or the range you selected) must be supplied to the recorder's calibration input.

7. Press the **50 mV** button in the Calibrate section. The Calibrate 50 mV box appears (Figure 8–2) and displays the readings for counts and mV.

Figure 8–2.

8. Set the precision voltage source to -50.000 mV, and press **Accept**.

9. Set the precision voltage source to +50.000 mV.

10. Press **Accept**, and the recorder returns to the first ADC Calibration screen. You are ready to calibrate the next range.

Note The mV reading in the text window may not show the correct value until range calibration is completed and you return to the calibration screen. ▲

Current Calibration

Figure 8–3.

The ADC current source is used for resistance measurements and needs calibration only if you need to make resistive measurements such as RTDs.

The recorder has an internal 400-ohm resistor that is used to perform the current calibration. No external hookups are required to perform this calibration. Refer to Figure 8–3 and the following steps.

Before calibrating currents, the 1 V range (at a minimum) must be calibrated.

1. From the Program menu, select **Measurement**, and enter the ADC Calibration screen by pressing Calibrate ADC.

2. Press the **Current** button on the bottom right of the screen, and the Calibrate Current screen opens.

3. Press **Accept**.

Note The mA reading may not show the correct value until current range calibration is completed and you return to the calibration screen. ▲

Restoring Calibration Constant Defaults

Three constants are calculated and saved in nonvolatile memory for each voltage range, and one constant is calculated and saved in nonvolatile memory for the current source. ADC measurement operation can be restored to the factory defaults if the calibration constants have been altered or lost. If the constants in memory are lost and/or the ADC measurement seems inaccurate, follow the procedure below to restore factory defaults.

This procedure is not a calibration procedure for your instrument. It is a procedure to restore the ADC constants from the original factory calibration. Do not perform this procedure if calibration equipment is available to calibrate your instrument.

Press the **Recall** button under the slot that you want to restore constant defaults, and they are reloaded for that board.

Chapter 9
The Function Menu

The Function menu enables you to access routine functions quickly.

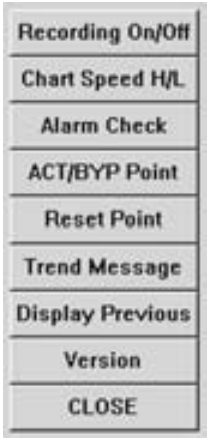

Figure 9–1.

Recording

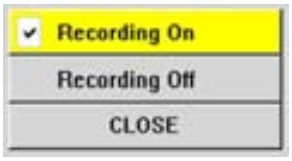

Figure 9–2.

The recording function causes the recorder to send the point data to the media. Enable/disable the recording function by pressing the appropriate selection. Press **Close**.

Chart Speed

Figure 9–3.

This menu item allows you to globally change the chart speed. Set the desired chart speed by pressing the appropriate selection. Press **Close**.

Alarm Check

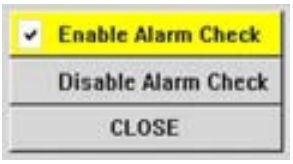

Figure 9–4.

The alarm check function causes point data to be compared to the alarm set point. Enable/disable the function by pressing the appropriate selection. Press **Close**.

Activate/Bypass Point

You can set any point or range of points to be bypassed so that they are not scanned. You can also activate a bypassed point or range of points.

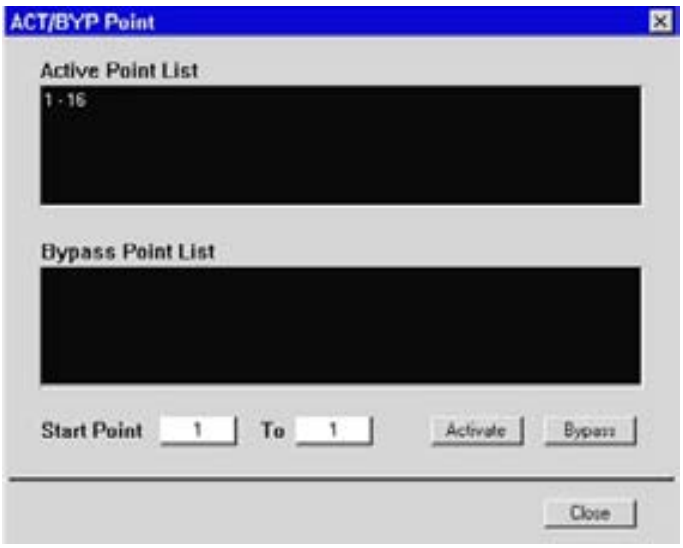

Figure 9–5.

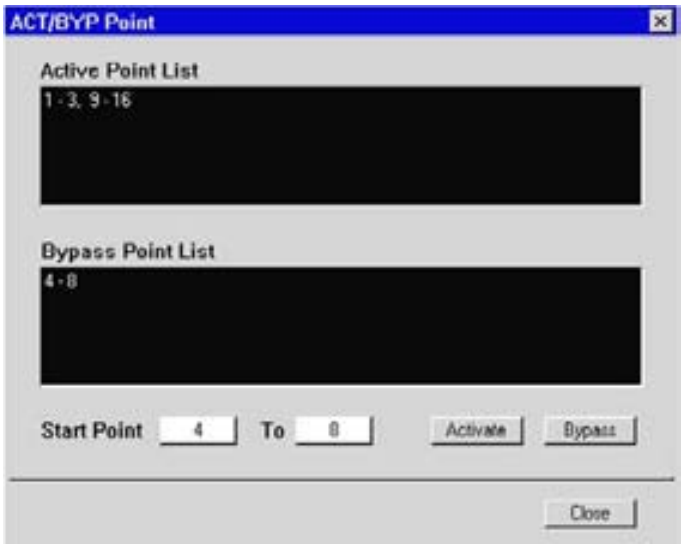

Figure 9–6.

1. Press the **Start Point** input box and enter the point (or the first point in the range of points).

2. Press **OK**.

3. If you are activating/bypassing a single point, continue to step 4. If you are activating/bypassing a range, press the **To** input box and enter the last point number in the range. Press **OK**.

4. Press **Activate** or **Bypass**. The Active Point List and/or Bypass Point List updates and displays the new active/bypassed point or range of points. Press **Close**.

Reset Point

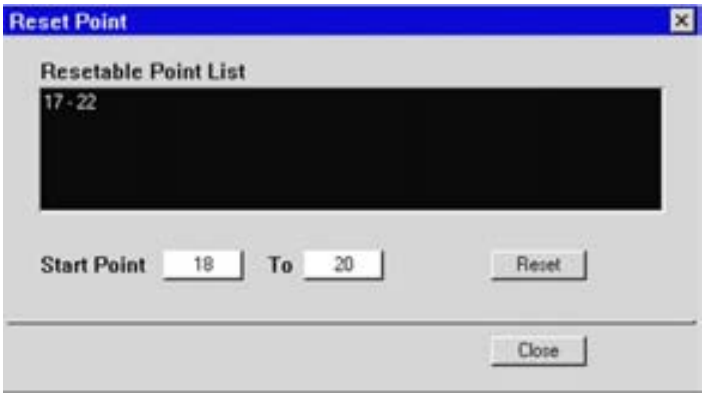

Figure 9–7.

1. Press the **Start Point** input box and enter the point (or the first point in the range of points).

2. Press **OK**.

3. If you are setting a single point as a reset point, continue to step 4. If you are setting a range as reset points, press the **To** input box and enter the last point number in the range. Press **OK**.

4. Press Reset. The Reset Point List updates and displays the new reset point/range of reset points. Press **Close**.

Trend Message

Before you set a message to print on the trend screens and to the event/alarm log, you must first program the messages, as detailed in "Digital I/O" in Chapter 4. Once you have completed this step, return to the display seen in Figure 9–8.

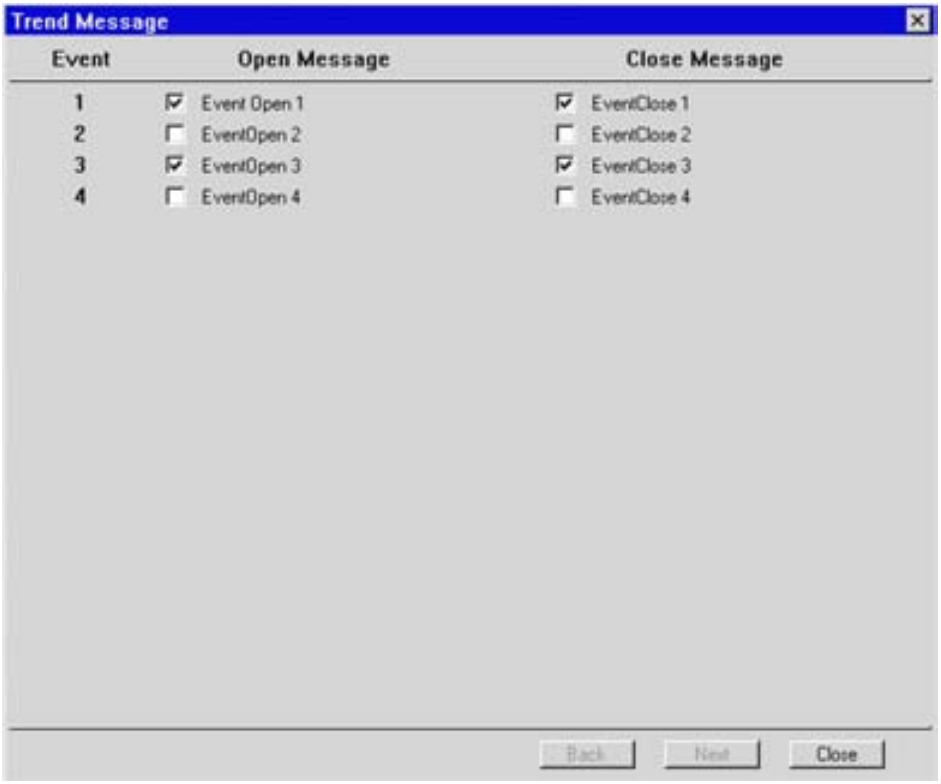

Figure 9–8.

1. Press the check box next to each message you want printed to the trend display. Use the Next and Back buttons as usual.

2. Press **Close**.

Chapter 10
Maintenance & Troubleshooting

Warning Hazardous potentials may exist on signal input terminals which are floating, with respect to case ground. These hazardous potentials may be on the rear terminal panel of your instrument. Any voltage potential at the signal source will exist at the instrument's respective signal input terminal, for example, power generator winding temperature monitoring thermocouples. ▲

Caution Use electrostatic protection devices when removing or installing printed circuit boards. Some components on the circuit boards are highly sensitive to electrostatic discharge and may be damaged if proper grounding procedures are not used. ▲

Routine Inspection & Cleaning

Verify that the recorder's operating environment is free of conditions that could interfere with its operation. Following is a table listing items we recommend that you visually inspect on a regular basis.

Table 10–1.

Item	Description	Corrective Measures
Display	Display should be visible. May be dim due to inactivity timeout.	Touch screen to return to normal brightness.
	Display still dim.	Go to Display Control, and set display brightness higher. If screen is still dim, refer to the troubleshooting table in this chapter.
Disk drive	Disk drive lamp remains on.	If a disk is present, remove it from the drive and insert a new formatted disk. If the light remains on, contact Thermo Fisher.

The unit may be cleaned by wiping it with a soft cloth. The front panel and display may be wiped with a slightly damp soft cloth containing a soapy solution or a mild detergent.

Caution Citric acid will damage the plastic on the front panel or display. Do not use any citrus-based products. ▲

Touch Screen Calibration

The touch screen is calibrated at the factory with the recorder mounted at eye level in order to correlate touch screen positions with entities (such as buttons) presented on the LCD user interface. Normally, there should be no reason to recalibrate the touch screen. When you touch each button or area directly, the unit should respond properly. If you have to touch a little above or below the button or if you have to touch the button more than once before the unit responds, the screen may require calibration.

1. Turn the recorder off then on again.

2. Touch the solid blue screen that appears after the boot-up process.

3. Figure 10–1 appears. Press **Calibrate Touch Screen**.

Figure 10–1.

4. When prompted, touch each designated point of the screen (Figure 10–2).

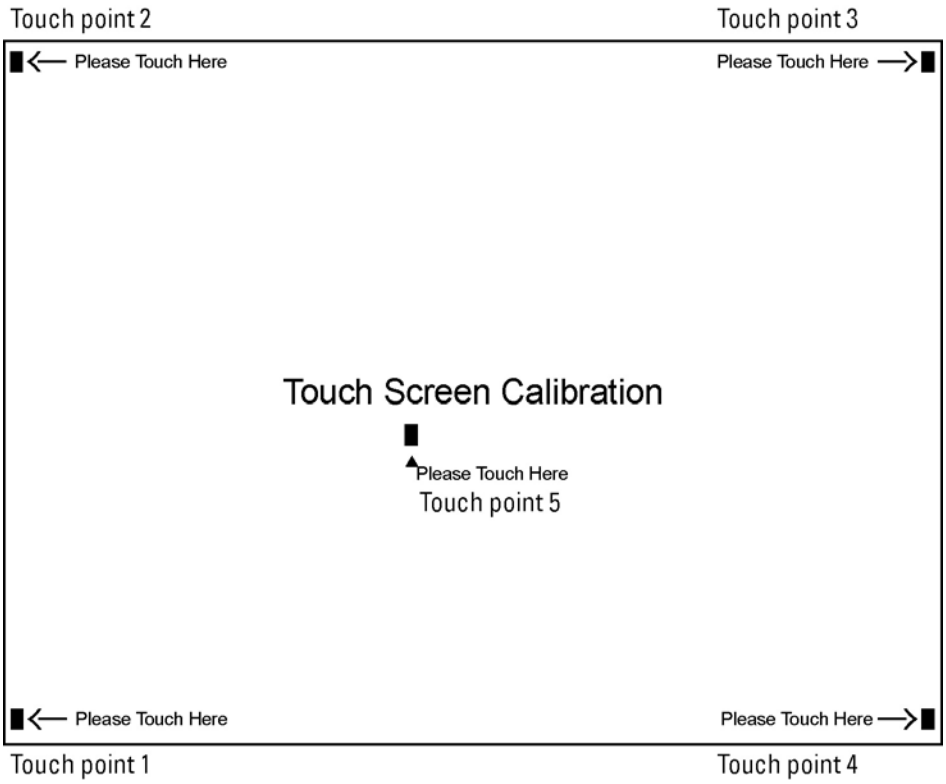

Figure 10–2.

5. Upon completion, the screen shown in Figure 10–1 appears again. When you press **OK**, the Delete Database screen appears. This function enables users with corrupt configurations to delete the database before a lock-up occurs that prevents them from using the touch screen keys. To continue without deleting the database, press **No**.

Caution Contact the factory PRIOR TO deleting the database. ▲

General Troubleshooting

Since the recorder is a complex instrument, we highly recommend that troubleshooting and repair be performed only by a competent individual (one capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and has authorization to make prompt corrective measures to eliminate them).

Before beginning a detailed analysis of a malfunctioning recorder, we recommend that you remove power from the recorder and perform a brief visual inspection to determine if the problem is inclusive to the recorder.

Perform the following:

1. Ensure all cable connectors are seated properly.

2. Ensure all connections to the rear terminal panel are secure and wired correctly (Chapter 2).

3. Use a VOM to ensure that the input voltage is applied to the operating power terminal strip.

The following table lists some common problems and possible solutions.

Table 10–2. Troubleshooting

Problem	Checkpoint	Yes/No	Solution
Display totally black.	Is power supply input voltage correct?	No	Connect recorder to proper input power supply.
	Is power supply board properly seated?	No	Reseat board.
	Does disk drive lamp illuminate periodically?	Yes	Power supply board and fuse are OK. Contact Thermo Fisher.
	Power supply board is properly seated and disk drive lamp does not illuminate.		1. Check and/or replace fuse on power supply board. 2. Replace power supply board, or return recorder with power supply module for repair.
Display is white or has white lines.	Touch screen several times and wait 10 seconds.		If display returns to normal, configuration file is corrupt. If display does not return to normal, display module or CPU module may be bad. Return for repair.
Display appears dim.	Are the temperature and humidity within specifications?		Temperature: -10°C to 50°C (14°F to 122°F) Humidity: 10 to 90 % RH, non-condensing
	Is screen dimmed due to period of inactivity?	Yes No	Touch display. Adjust intensity level setting (Chapter 4).
	Intensity level setting correct?	No	Adjust intensity level setting (Chapter 4).
Screen not displaying correct data.	Is recorder in Live mode?	No	Switch to Live mode (Chapter 4).
	Is digital filter constant 0?	No	Check filter process.
	Is input signal's amplitude fluctuating rapidly?	Yes	Verify recorder can follow input.

Problem	Checkpoint	Yes/No	Solution
Screen not displaying correct data, cont.	Recorder is in Live mode, digital filter constant is 0, and input signal's amplitude is not fluctuating rapidly.		Contact Thermo Fisher.
No data on disk.	Is proper media type selected?	No	Select proper media type (Chapter 4).
	Is disk formatted correctly?	No	Format disk.
	Is History function enabled?	No	Enable function (Chapter 4).
	Can you save configuration file to media?	No	Check History function.
		Yes	Replace media drive.

Diagnostics

Figure 10–3.

Access the Diagnostics menu by pressing PGM, System, and Diagnostics. This menu allows you to perform a certain amount of diagnostics on the recorder from the front display.

Watchdog

The Watchdog Timer test function tests the watchdog timer circuit which monitors the software execution on the CPU. Initiating this test removes the tickler signal from the watchdog timer, allowing the timer to time out and reset the unit.

1. Press **Watchdog Test**.

2. Press **Accept** on the first screen, and the Unit Reset Timer screen is displayed. The unit resets after 10 seconds.

Ambients

This function tests the ambient temperature circuits on the rear terminal panel. A screen displays the temperature reading for the upper and lower sensors. If these temperatures are not accurate, the temperature sensor circuits are malfunctioning. Refer to Figure 10–4.

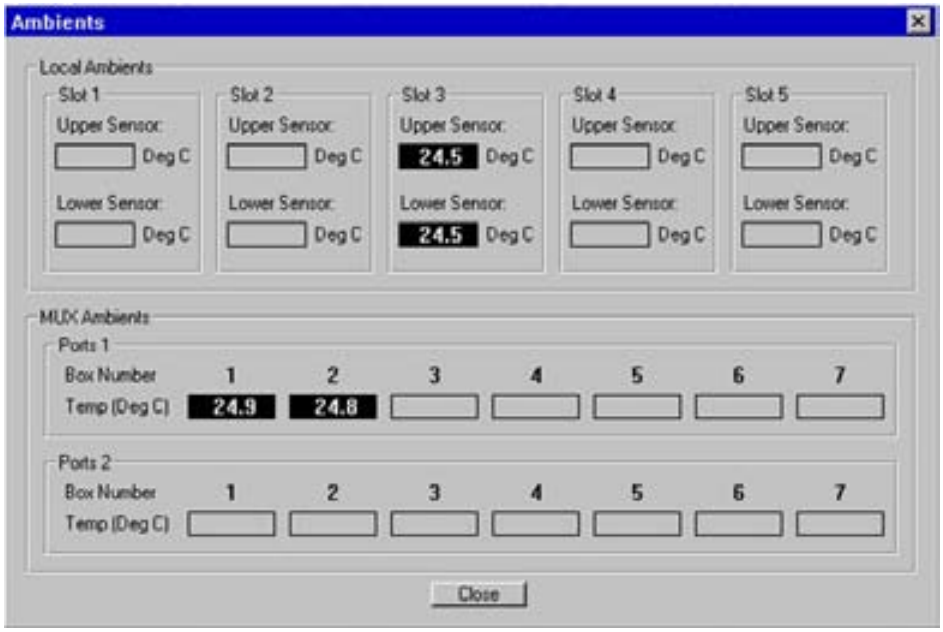

Figure 10–4.

Note The MUX Ambients block is not available with standard units. ▲

Display

This test allows you to verify each pixel in the screen is functioning. When the test is initiated, the screen changes colors with each touch (red, blue, green, white, black). When each color is displayed individually, you can see if any pixels are not being turned on.

FTP

This function allows you to test communications with the primary and secondary FTP servers.

Figure 10–5.

1. Press **FTP Test**, and press either the **Primary** or **Secondary** button.

2. Press **FTP Test** and wait for a response. A window appears, informing you of the status of FTP communications.

3. Press **Cancel** to exit this function.

GPIO

This function allows you to test the functionality of two main features of the discrete input/output circuitry for each of the installed GPIO cards.

Event switch input states are displayed under the IN columns. Check the OPEN/CLOSE messages and verify correct operation of each of the event inputs by connecting/disconnecting a jumper at the RTP event inputs.

Alarm contact output states are displayed under the OUT columns. The display shows the slot where the GPIO board resides and the relays on it. The display also shows the normal state of the relay on the left side and the current state of the relay on the right side.

1. Press each box on the right side to see the relay change states.

2. Press **Cycle Contacts On** to cause the relays to continuously cycle from open to closed.

3. Press **Off** to stop cycling.

4. Press **Close** button when testing is complete.

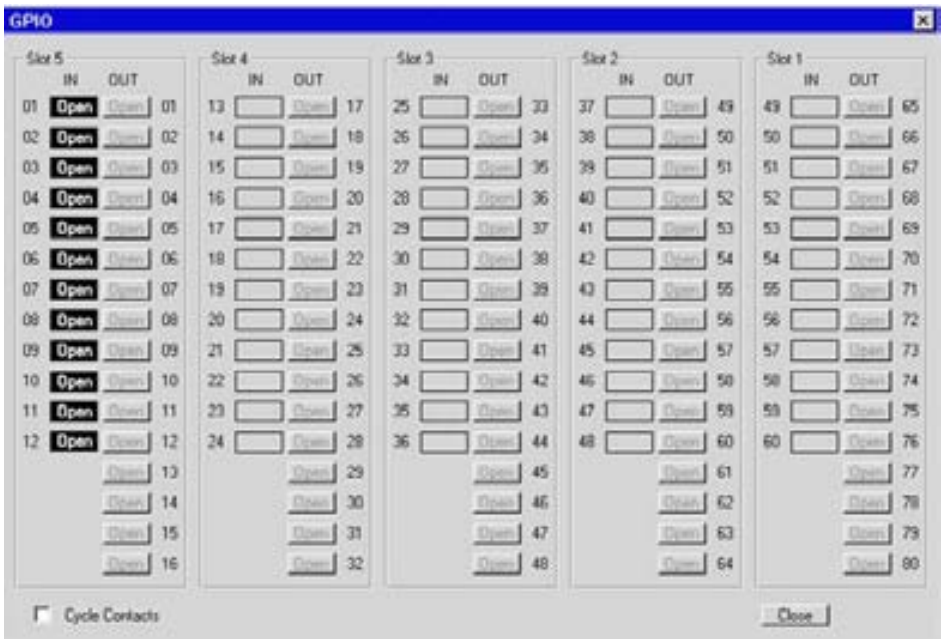

Figure 10–6.

Replacing Circuit Boards

Refer to Figure 10–7 for locations of internal circuit boards.

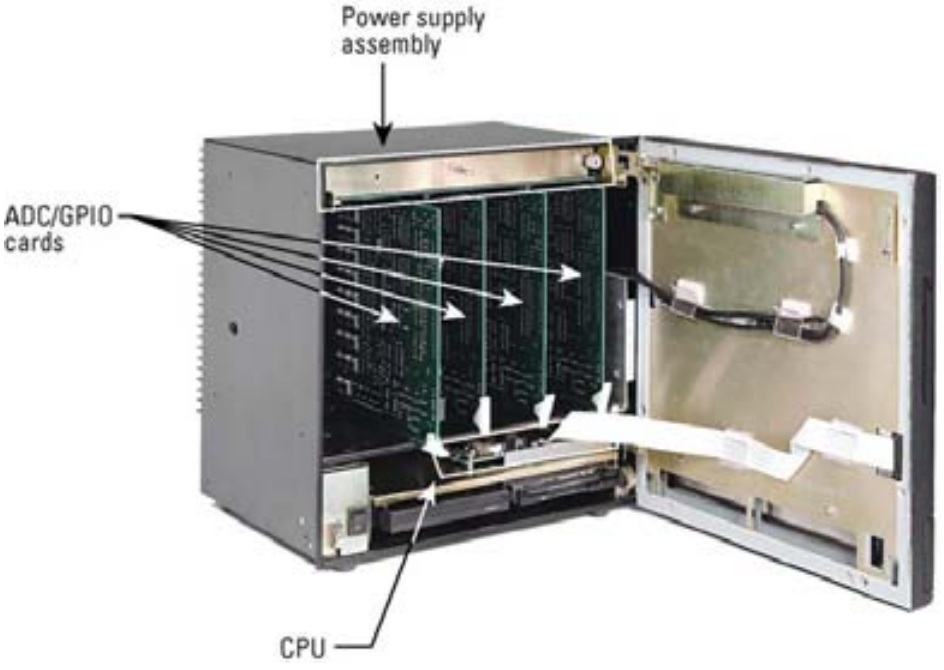

Figure 10–7.

CPU DIP Switch Settings

The following table includes the switch control operations and normal settings for the instrument.

Table 10–3.

Switch	Control Operation	Normal Setting
1, 2, 3	CPU clock speed	1 = off, 2 = on, 3 = off (233 MHz)
4	Master/slave selection for the compact Flash socket	4 = off (master)
5	Enables/disables safe boot (force system boot from Flash disk or floppy drive)	5 = off (boot from Flash disk)
6	Enables/disable system watchdog	6 = on (watchdog enabled)
7	Enables/disables serial com ports 3 and 4	7 = on (serial ports enabled)
8	Enables/disables graphics controller VGA output	8 = on (VGA output enabled)

Service

The local representative is the first contact for support and is well equipped to answer questions and provide application assistance. Your representative has access to product information and current software revisions. You can also contact Thermo Fisher directly.

In the United States

Thermo Fisher Scientific
1410 Gillingham Lane
Sugar Land, TX 77478
Phone: 713-272-0404
Fax: 713-272-2272

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Thermo Fisher Scientific
14 Gormley Industrial Avenue
Gormley, Ontario
L0H 1G0
Phone: 905-888-8808
Fax: 905-888-8828

In Europe

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Ion Path
Road Three
Winsford
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United Kingdom
Phone: +44 (0) 1606 548700

On the Web

www.thermo.com

Warranty

Thermo Scientific products are warranted to be free from defects in material and workmanship at the time of shipment and for one year thereafter. Any claimed defects in Thermo Scientific products must be reported within the warranty period. Thermo Fisher Scientific shall have the right to inspect such products at Buyer's plant or to require Buyer to return such products to Thermo Fisher plant.

In the event Thermo Fisher requests return of its products, Buyer shall ship with transportation charges paid by the Buyer to Thermo Fisher plant. Shipment of repaired or replacement goods from Thermo Fisher plant shall be F.O.B. Thermo Fisher plant. A quotation of proposed work will be sent to the customer. Thermo Fisher shall be liable only to replace or repair, at its option, free of charge, products which are found by Thermo Fisher to be defective in material or workmanship, and which are reported to Thermo Fisher within the warranty period as provided above. This right to replacement shall be Buyer's exclusive remedy against Thermo Fisher.

Thermo Fisher shall not be liable for labor charges or other losses or damages of any kind or description, including but not limited to, incidental, special or consequential damages caused by defective products. This warranty shall be void if recommendations provided by Thermo Fisher or its Sales Representatives are not followed concerning methods of operation, usage and storage or exposure to harsh conditions.

Materials and/or products furnished to Thermo Fisher by other suppliers shall carry no warranty except such suppliers' warranties as to materials and workmanship. Thermo Fisher disclaims all warranties, expressed or implied, with respect to such products.

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Chapter 11
Documentation

Note Information presented in this chapter has been regenerated from original drawings. Every effort is made to maintain document accuracy. However, in order to enhance legibility, the documents may have been restructured, and some information may have been intentionally excluded. Therefore, the drawings within this manual may not be exact duplicates of the original drawings. ▲

Table 11–1. Installation & top assembly drawings

Drawing #	Rev.	Description	Page
DM100171	A	Installation Dimensions (1 sheet)	11-3
DM100172	A	Rear Terminal Assignment, Standard Recorder (8 sheets)	11-4
		Rear Terminal Assignment, Multibank Recorder (1 sheet)	11-12
ZM100133	J	Recorder Assembly Parts List (2 sheets)	11-13
ZM100133C	H	Recorder Assembly Parts List (2 sheets)	11-15
ZM100134	C	Recorder Assembly Drawing (4 sheets)	11-17
ZM100134C	B	Recorder Assembly Drawing (2 sheets)	11-21
ZA100207	1	Door Assembly (1 sheet)	11-25
ZA100207-01	1	Door Assembly Parts List (1 sheet)	11-26
ZA100208	A	Enclosure Assembly (5 sheets)	11-27
ZB100980	B	Chassis Assembly (3 sheets)	11-32
ZB100980-01	B	Chassis Assembly Parts List, Floppy Drive Only (1 sheet)	11-35
ZB100980-02	B	Chassis Assembly Parts List, Floppy and Zip Drives (1 sheet) (for reference only)	11-36
ZB100980-03	B	Chassis Assembly Parts List, Floppy and PC Card Drives (1 sheet)	11-37

Table 11–2. PCB assembly parts list

Drawing #	Rev.	Description	Page
CB100503	A	Rear Terminal Panel PCB Assembly Parts List, Standard Recorder (1 sheet)	11-38
CB100538	A	Rear Terminal Panel PCB Assembly Parts List, Multibank Recorder (1 sheet)	11-39
CB100504	A	Power Input PCB Assembly Parts List (1 sheet)	11-40
CB100505	B	Power Supply Carrier PCB Assembly Parts List (2 sheets)	11-41
CB100506-01	B	Standard ADC PCB Assembly Parts List (1 sheet)	11-43
CB100506-02	B	ADC with RTD PCB Assembly Parts List (1 sheet)	11-44
CB100537		ADC Board PCB Assembly Parts List, Multibank Recorder	11-45
CB100507	B	GPIO Assembly Parts List (1 sheet)	11-47
CB100515	A	DC Power Supply Carrier PCB Assembly Parts List (1 sheet)	11-49

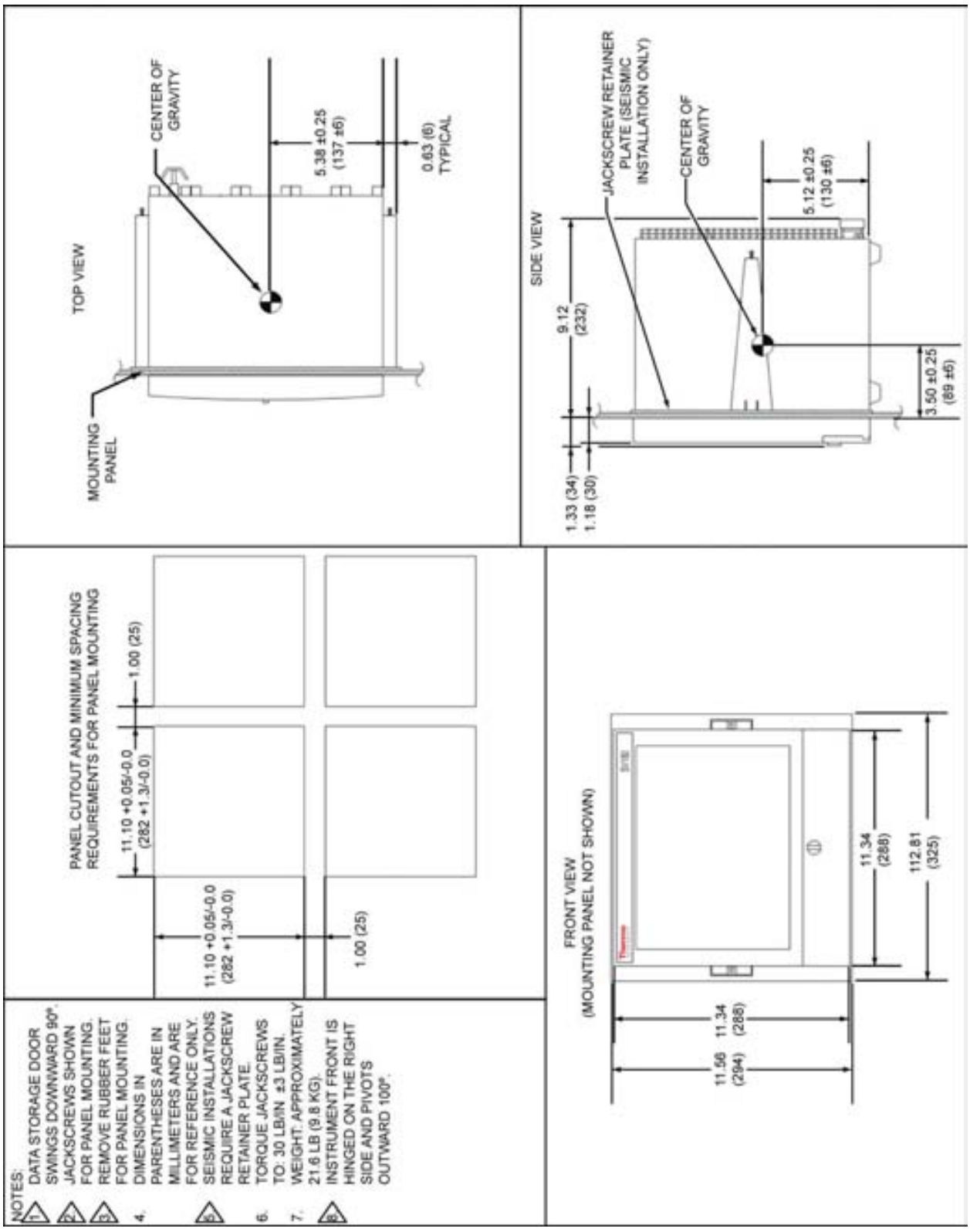
TOP VIEW
CENTER OF GRAVITY
5.38 ±0.25 (137 ±6)
0.63 (6) TYPICAL
MOUNTING PANEL
SIDE VIEW
JACKSCREW RETAINER PLATE (SEISMIC INSTALLATION ONLY)
CENTER OF GRAVITY
5.12 ±0.25 (130 ±6)
9.12 (232)
3.50 ±0.25 (89 ±6)
1.33 (34)
1.18 (30)
PANEL CUTOUT AND MINIMUM SPACING REQUIREMENTS FOR PANEL MOUNTING
11.10 +0.05/-0.0 (282 +1.3/-0.0)
1.00 (25)
11.10 +0.05/-0.0 (282 +1.3/-0.0)
1.00 (25)
FRONT VIEW (MOUNTING PANEL NOT SHOWN)
11.34 (288)
11.56 (294)
11.34 (288)
12.81 (325)
NOTES:
1. DATA STORAGE DOOR SWINGS DOWNWARD 90°.
2. JACKSCREWS SHOWN FOR PANEL MOUNTING.
3. REMOVE RUBBER FEET FOR PANEL MOUNTING.
4. DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS AND ARE FOR REFERENCE ONLY.
5. SEISMIC INSTALLATIONS REQUIRE A JACKSCREW RETAINER PLATE.
6. TORQUE JACKSCREWS TO: 30 LB/IN ±3 LB/IN.
7. WEIGHT: APPROXIMATELY 21.6 LB (9.8 KG).
8. INSTRUMENT FRONT IS HINGED ON THE RIGHT SIDE AND PIVOTS OUTWARD 100°.

Figure 11–1. DM100171: Installation dimensions (sheet 1 of 1)

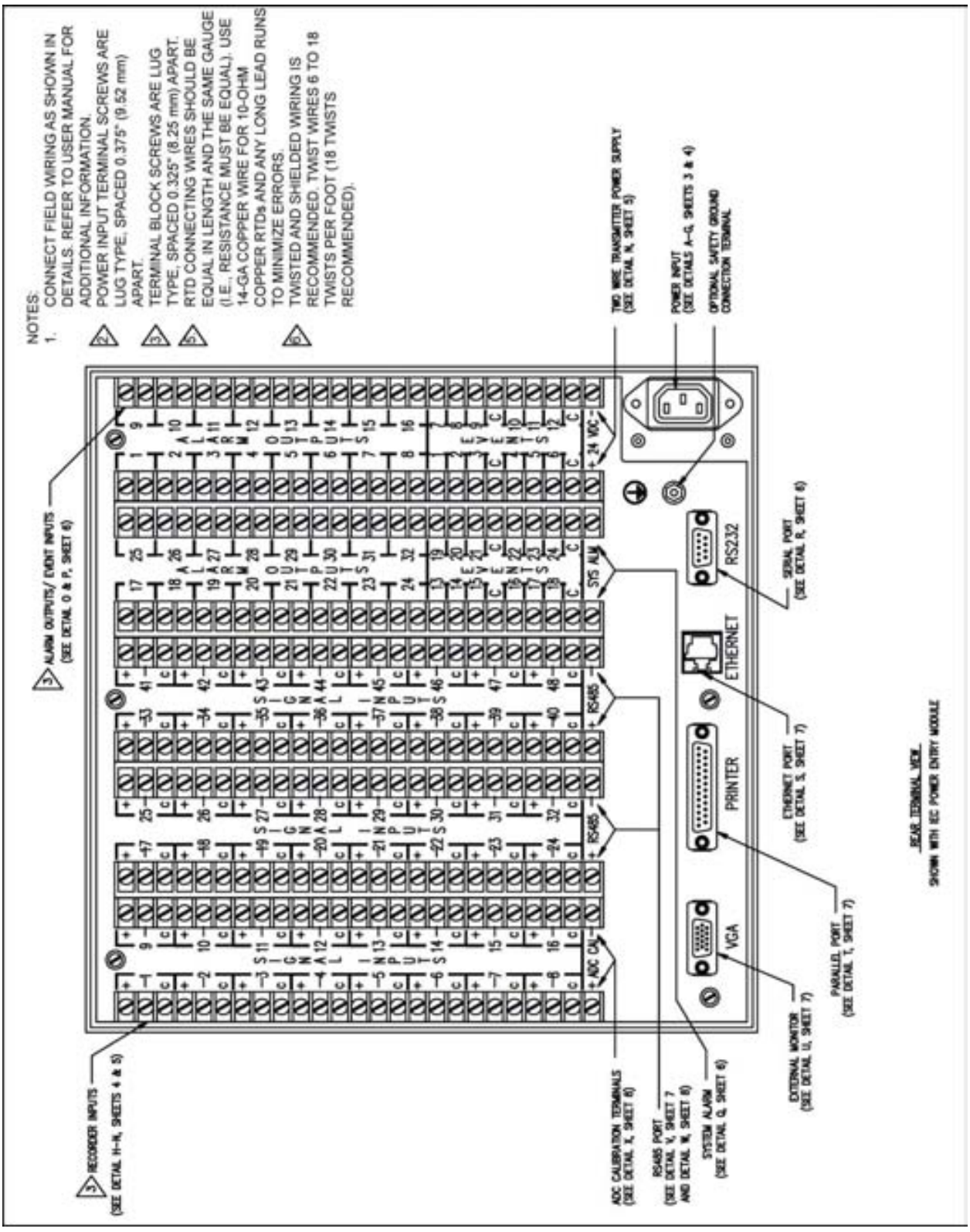
NOTES:
1. CONNECT FIELD WIRING AS SHOWN IN DETAILS. REFER TO USER MANUAL FOR ADDITIONAL INFORMATION.
2. POWER INPUT TERMINAL SCREWS ARE LUG TYPE, SPACED 0.375" (9.52 mm) APART.
3. TERMINAL BLOCK SCREWS ARE LUG TYPE, SPACED 0.325" (8.25 mm) APART.
4. RTD CONNECTING WIRES SHOULD BE EQUAL IN LENGTH AND THE SAME GAUGE (I.E., RESISTANCE MUST BE EQUAL). USE 14-GA COPPER WIRE FOR 10-OHM COPPER RTDs AND ANY LONG LEAD RUNS TO MINIMIZE ERRORS.
5. TWISTED AND SHIELDED WIRING IS RECOMMENDED. TWIST WIRES 6 TO 18 TWISTS PER FOOT (18 TWISTS RECOMMENDED).
TWO WIRE TRANSMITTER POWER SUPPLY (SEE DETAIL N, SHEET 5)
POWER INPUT (SEE DETAILS A–G, SHEETS 3 & 4)
OPTIONAL SAFETY GROUND CONNECTION TERMINAL
ALARM OUTPUTS/ EVENT INPUTS (SEE DETAIL O & P, SHEET 6)
RECORDER INPUTS (SEE DETAIL H–H, SHEETS 4 & 5)
ADC CALIBRATION TERMINALS (SEE DETAIL X, SHEET 6)
RS485 PORT (SEE DETAIL V, SHEET 7 AND DETAIL W, SHEET 6)
SYSTEM ALARM (SEE DETAIL Q, SHEET 6)
EXTERNAL MONITOR (SEE DETAIL U, SHEET 7)
PARALLEL PORT (SEE DETAIL T, SHEET 7)
ETHERNET PORT (SEE DETAIL S, SHEET 7)
SERIAL PORT (SEE DETAIL R, SHEET 6)
RS232
ETHERNET
PRINTER
VGA
SYS ALM
RS485
ADC CAL
+24 VDC
REAR TERMINAL VIEW
SHOWN WITH IEC POWER ENTRY MODULE

Figure 11–2. DM100172: Rear terminal assignment (sheet 1 of 8)

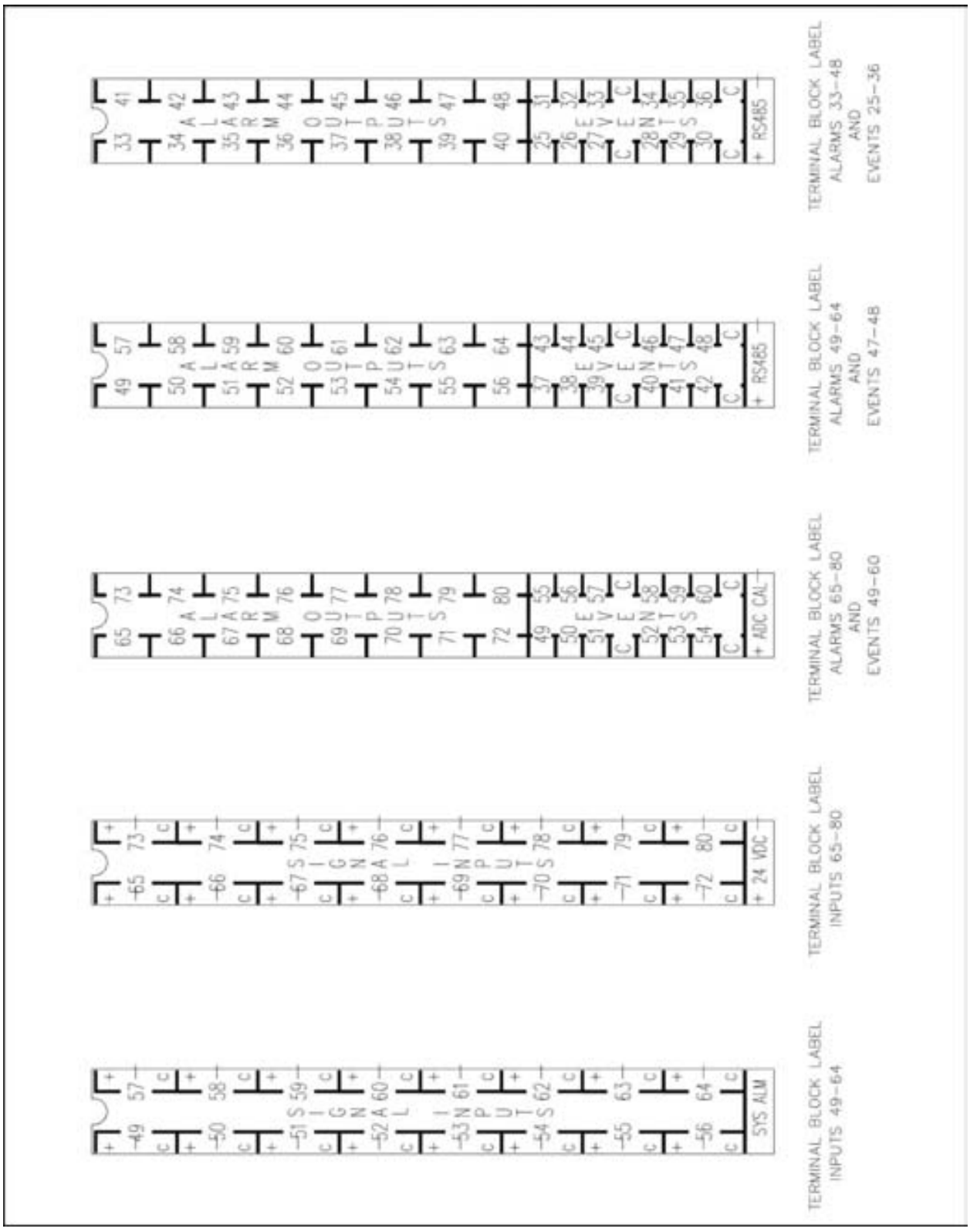

Figure 11–3. DM100172: Rear terminal assignment (sheet 2 of 8)

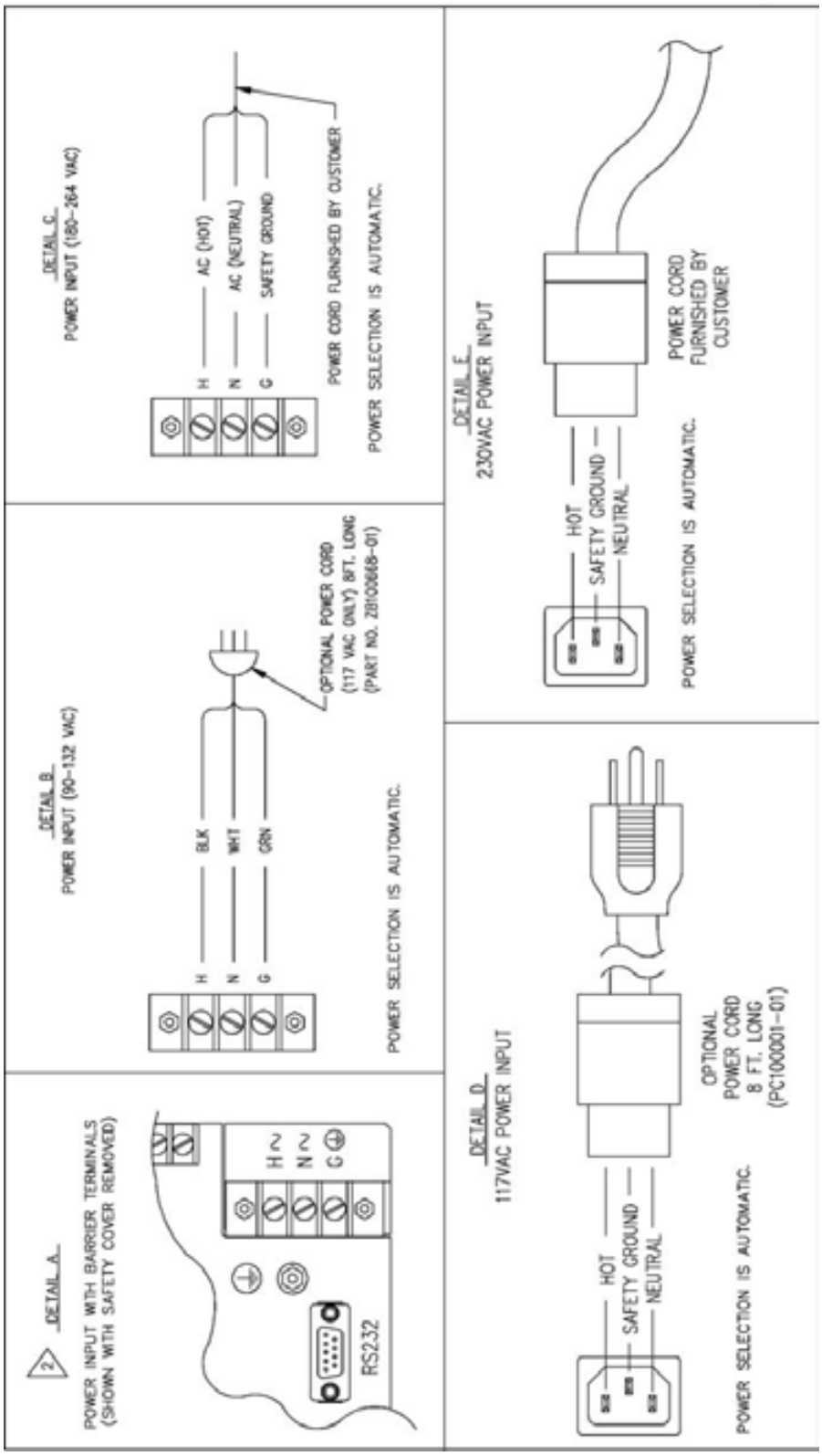

Figure 11–4. DM100172: Rear terminal assignment (sheet 3 of 8)

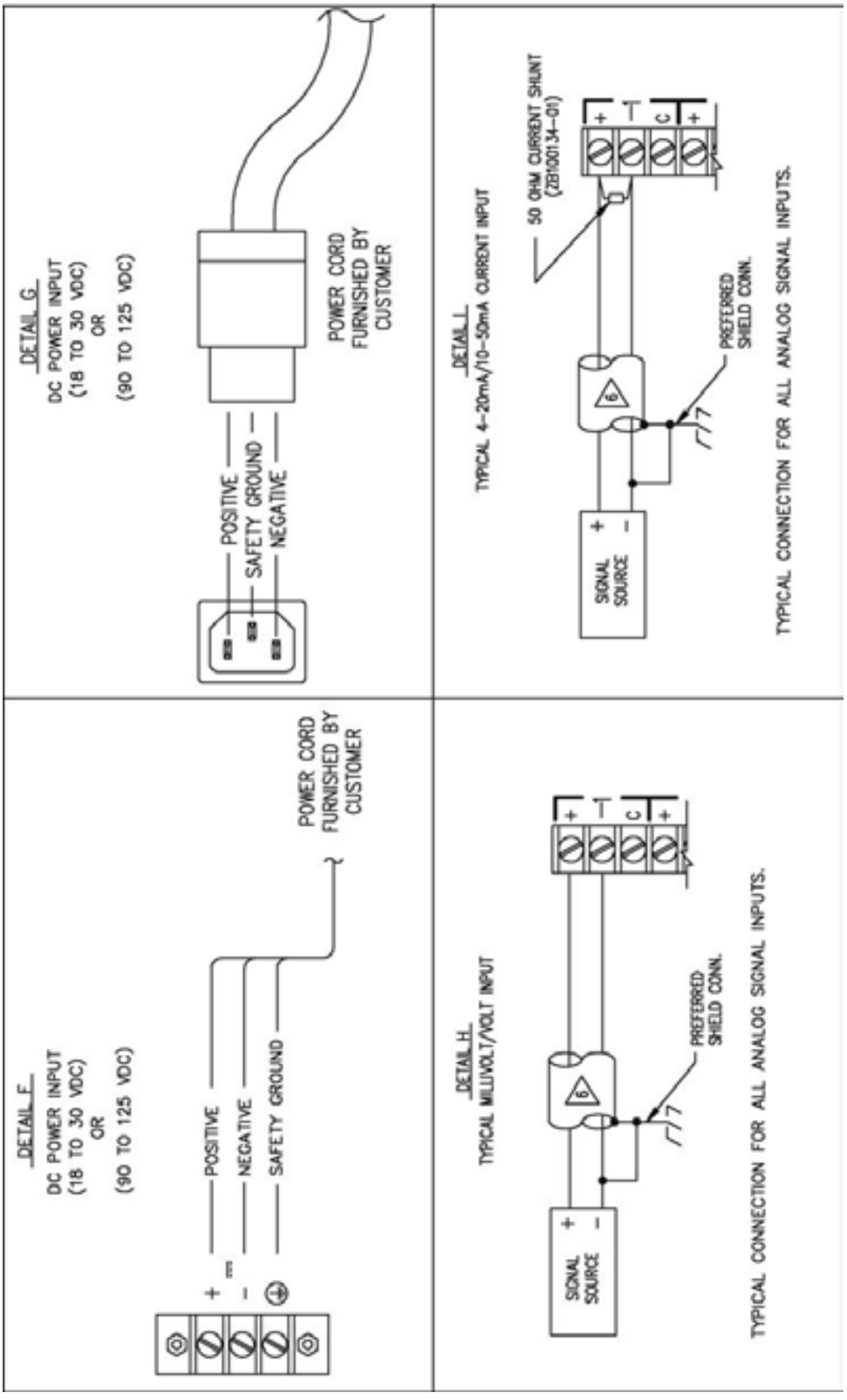

Figure 11–5. DM100172: Rear terminal assignment (sheet 4 of 8)

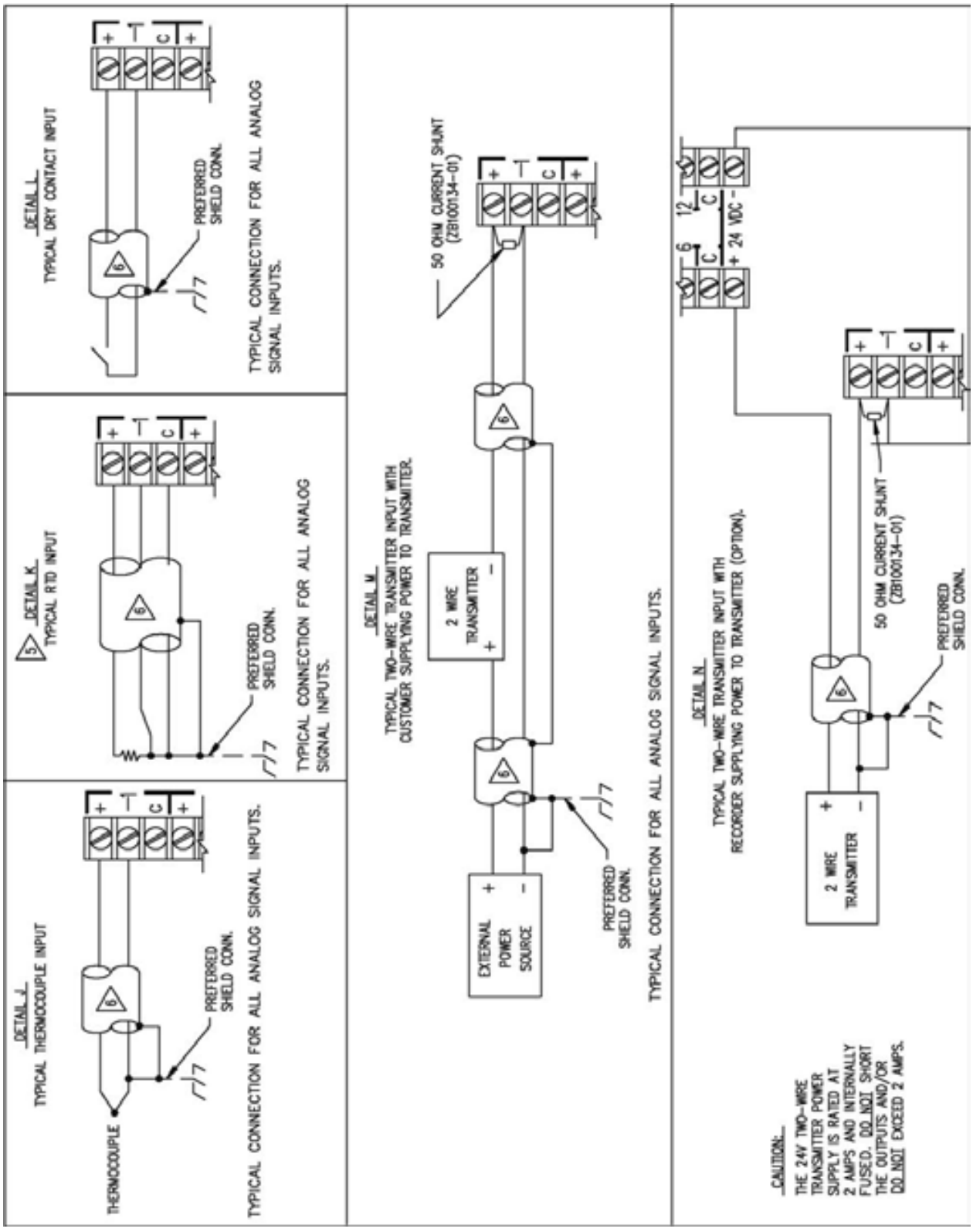
DETAIL L
TYPICAL DRY CONTACT INPUT
PREFERRED SHELD CONN.
TYPICAL CONNECTION FOR ALL ANALOG SIGNAL INPUTS.
5 DETAIL K
TYPICAL RTD INPUT
PREFERRED SHELD CONN.
TYPICAL CONNECTION FOR ALL ANALOG SIGNAL INPUTS.
DETAIL J
TYPICAL THERMOCOUPLE INPUT
PREFERRED SHELD CONN.
THERMOCOUPLE
TYPICAL CONNECTION FOR ALL ANALOG SIGNAL INPUTS.
DETAIL M
TYPICAL TWO-WIRE TRANSMITTER INPUT WITH CUSTOMER SUPPLYING POWER TO TRANSMITTER.
50 OHM CURRENT SHUNT (Z81001134-01)
2 WIRE TRANSMITTER
EXTERNAL POWER SOURCE
PREFERRED SHELD CONN.
TYPICAL CONNECTION FOR ALL ANALOG SIGNAL INPUTS.
DETAIL N
TYPICAL TWO-WIRE TRANSMITTER INPUT WITH RECORDER SUPPLYING POWER TO TRANSMITTER (OPTION).
12
6
+ 24 VDC -
50 OHM CURRENT SHUNT (Z81001134-01)
PREFERRED SHELD CONN.
2 WIRE TRANSMITTER
CAUTION:
THE 24V TWO-WIRE TRANSMITTER POWER SUPPLY IS RATED AT 2 AMPS AND INTERNALLY FUSED. DO NOT SHORT THE OUTPUTS AND/OR DO NOT EXCEED 2 AMPS.

Figure 11–6. DM100172: Rear terminal assignment (sheet 5 of 8)

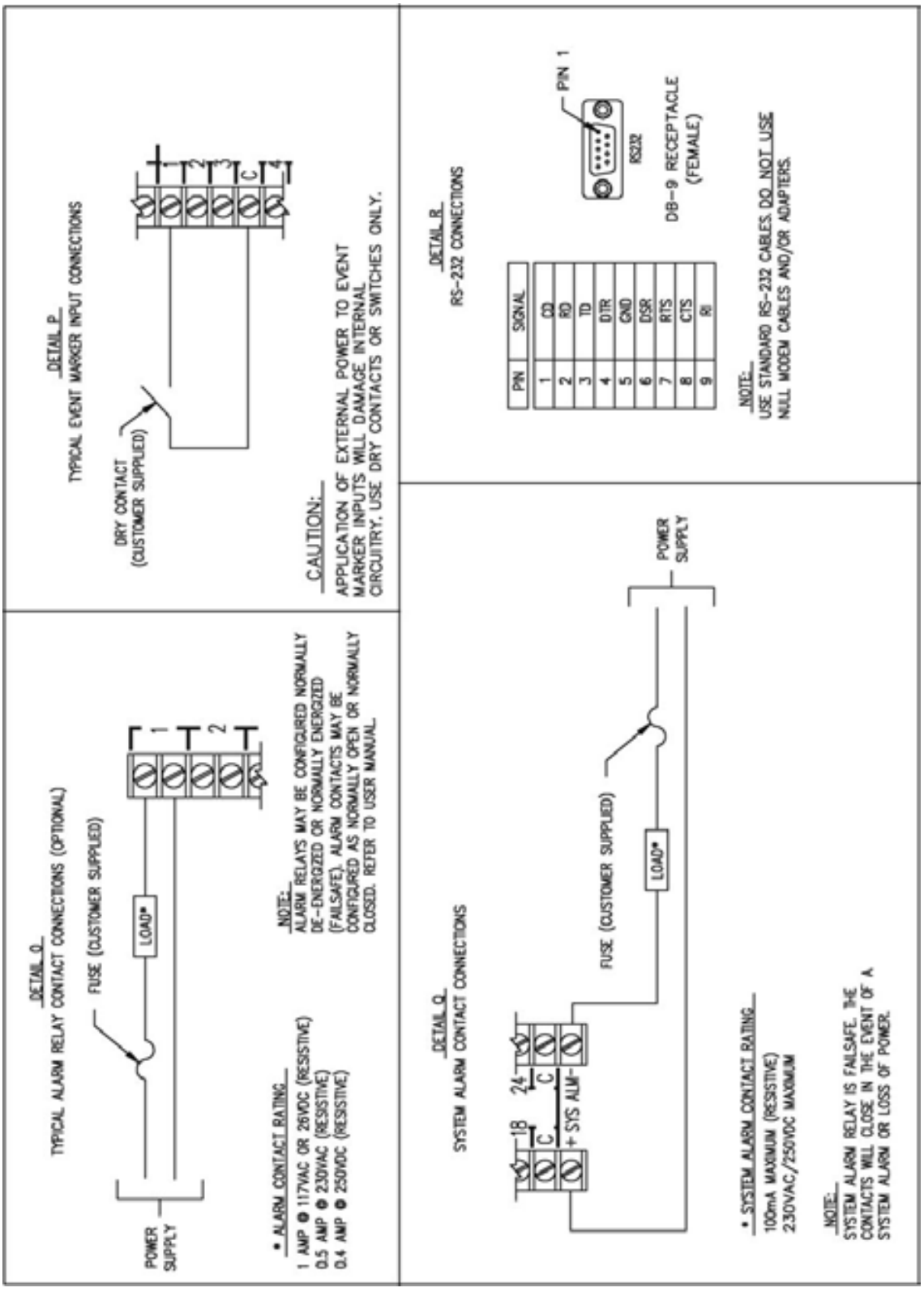

Figure 11–7. DM100172: Rear terminal assignment (sheet 6 of 8)

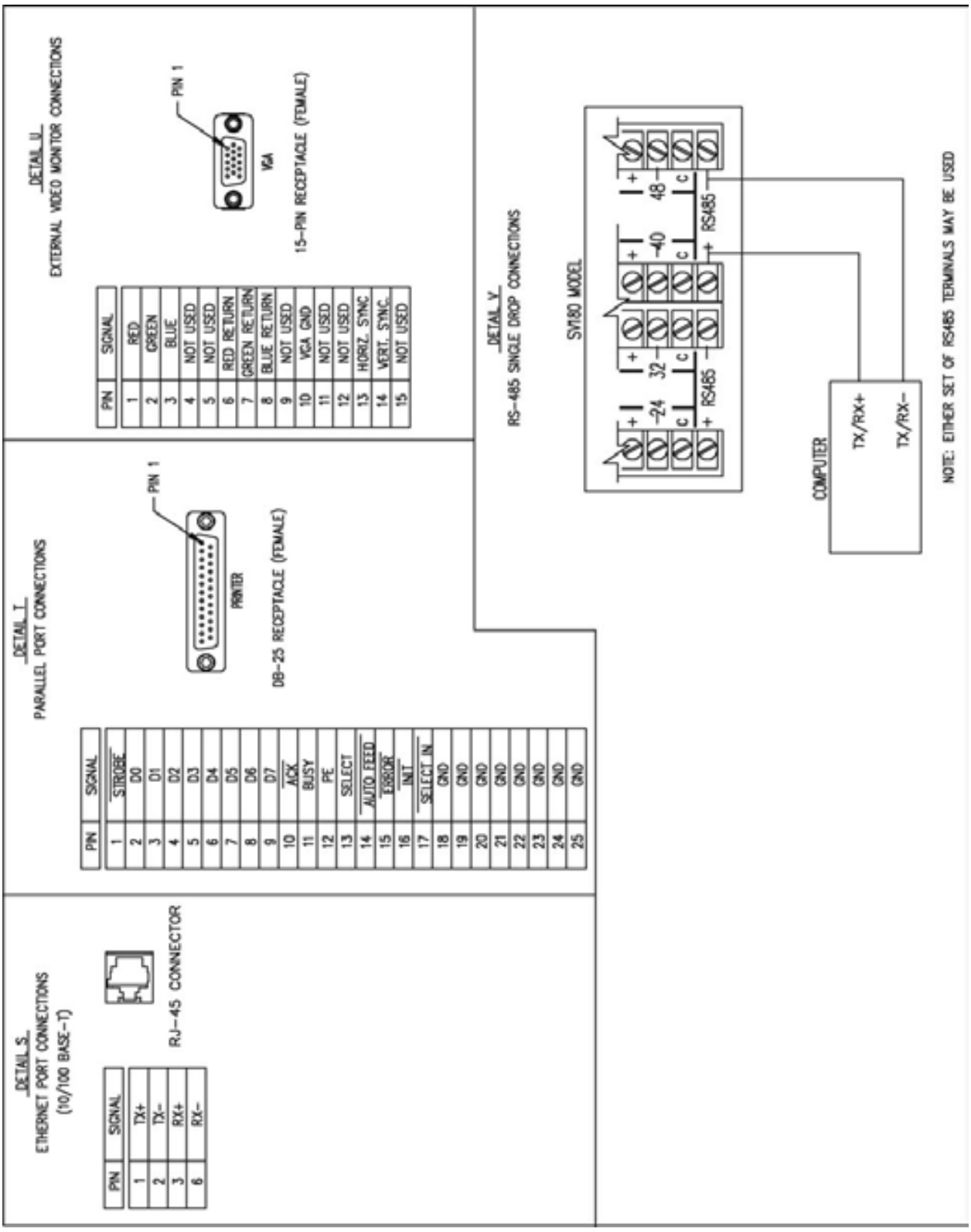

Figure 11–8. DM100172: Rear terminal assignment (sheet 7 of 8)

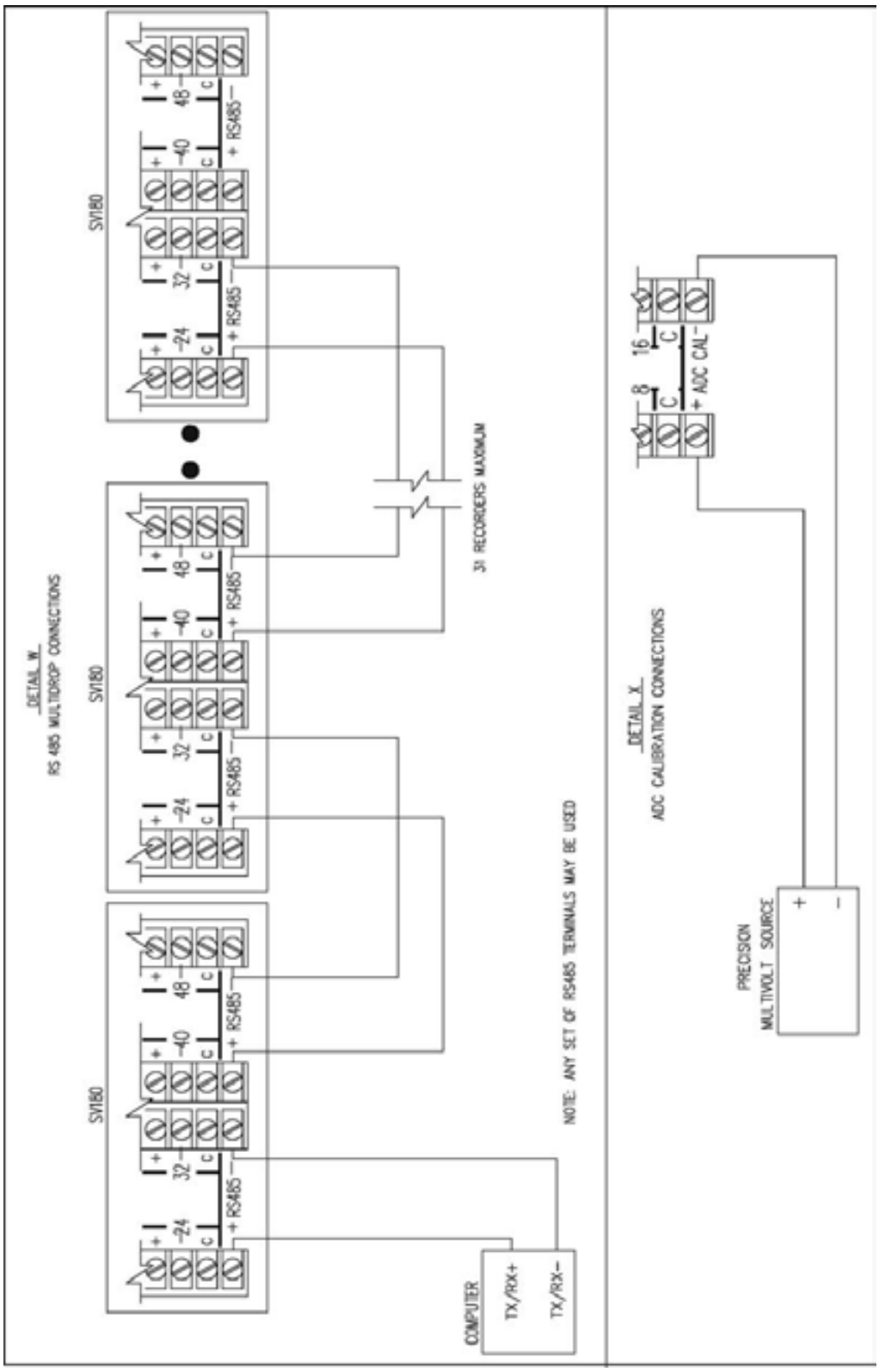

Figure 11–9. DM100172: Rear terminal assignment (sheet 8 of 8)

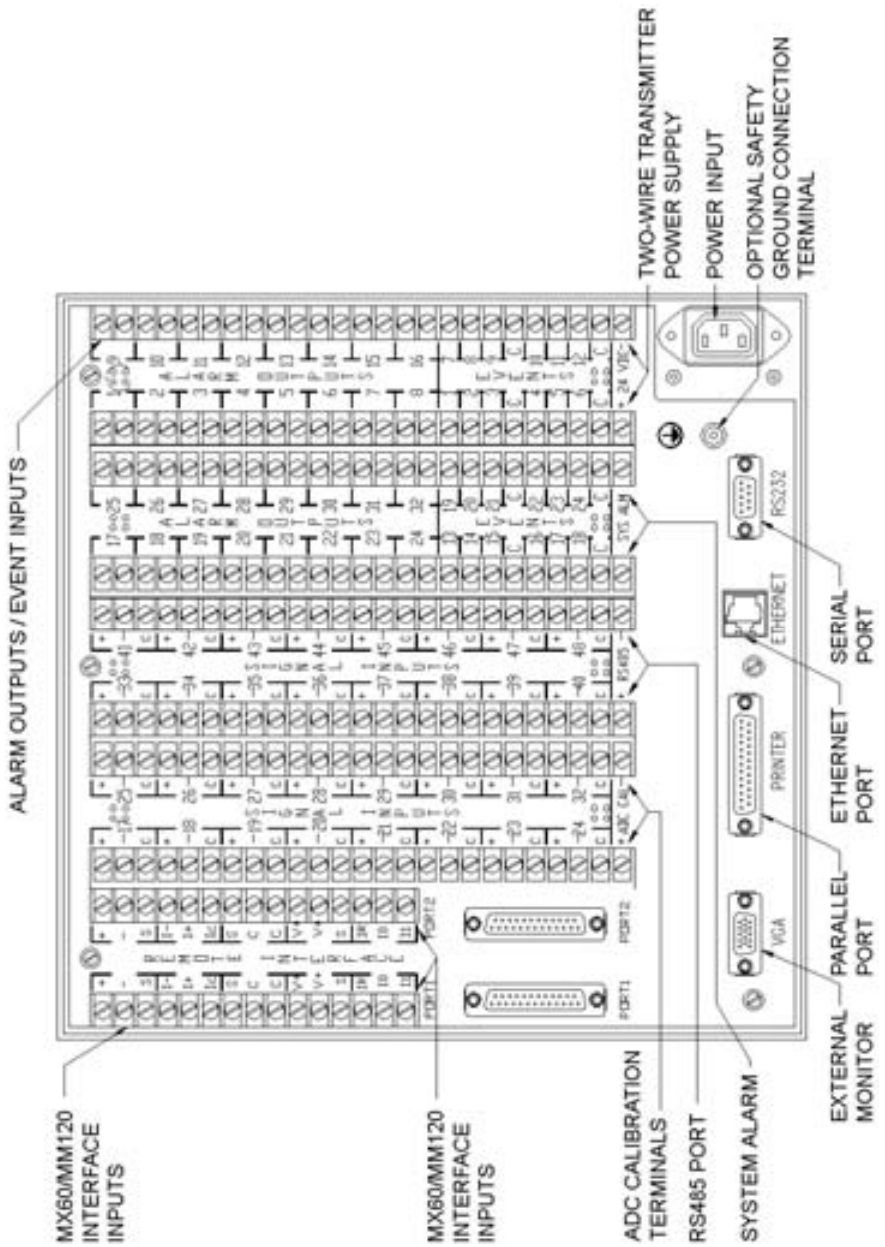

Figure 11–10. Rear terminal assignment for multibank recorder (sheet 1 of 1)

AR	50	LB100623-04	C	LABEL – REAR TERMINAL (O49-64)
AR	49	LB100623-03	C	LABEL – REAR TERMINAL (O33-48)
AR	48	LB100623-02	C	LABEL – REAR TERMINAL (I65-80)
AR	47	LB100623-01	C	LABEL – REAR TERMINAL (I49-64)
REF	46	MO100217-01	--	SOFTWARE V & V
REF	45	2L0198EEPRI1	--	EMC TEST REPORT
REF	44	MO100205-01	--	SEISMIC TEST REPORT
AR	43	KT100324-01	B	KIT – HANDLE, MOD AND INSTL
REF	42	MO100202-01	--	USER MANUAL
1	41	PI100158-01	--	SOFTWARE – PROVIEW PLUS
	40			
AR	39	ZB100997-01	B	ASSY – BLANKING PANEL
4	38	HW015004-04	A	WASHER – #4 INTERNAL LOCK
AR	37	HW011404-07	A	SCREW – #4-40 x 7/16, BH (PWR BARRIER)
AR	36	MP102332-01	B	COVER – TERMINAL (PWR BARRIER)
AR	35	SP100200-22	A	SPACER – 0.25 HEX x 0.75 LG (PWR BARRIER)
AR	34	HW011404-16	A	SCREW – #4-40 x 1, BH (PWR BARRIER)
1	33	LB100265-03	B	LABEL – DANGER
REF	32	PA100201-20	--	PCMCIA TYPE II FLASH DISK – 20 MBYTE
REF	31	PA100201-10	--	PCMCIA TYPE II FLASH DISK – 10 MBYTE
REF	30	PA100201-04	--	PCMCIA TYPE II FLASH DISK – 4 MBYTE
AR	29	PC100001-01	--	POWER CORD ASSY – IEC 320
AR	28	PC000201-01	--	POWER CORD ASSY
	27			
AR	26	ZB100134-01	B	RESISTOR ASSY – 50-OHM SHUNT WITH LUGS
AR	25	MP102612-01	C	PLATE – JACKSCREW RETAINER
1	24	KT100313-02	B	JACKSCREW KIT
1	23	LB100478-01	A	LABEL – MADE IN USA
1	22	LB100655-01	A	NAME PLATE – SV SERIES, CE MARK
REF	21	DM100172-01	D	REAR TERMINAL ASSIGNMENTS
REF	20	DM100171-01	D	INSTALLATION DIMENSIONS
REF	19	LB100619-01	A	LABEL – ADC CONSTANTS
1	18	MP102607-01	C	SEAL – PANEL
1	17	LB100628-01	--	LABEL – REALTIME
AR	16	CB100504-01	A	PCB ASSY – INPUT POWER (BARRIER)
2	15	HW011406-08	A	SCREW – #6-32 x 1/2, BH (DOOR ANCHOR)
1	14	LB100654-01	--	LABEL – CAUTION MARK
	13			
	12			
AR	11	ZB100980-03	D	CHASSIS ASSY (FLOPPY/PC CARD)
AR	10	ZB100980-02	D	CHASSIS ASSY (FLOPPY/ZIP)
AR	9	ZB100980-01	D	CHASSIS ASSY (FLOPPY ONLY)
AR	8	CB100507-01	A	PCB ASSY – GPIO
AR	7	CB100506-02	A	PCB ASSY – ADC (mV, V, mA, T/C, RTD)
AR	6	CB100506-01	A	PCB ASSY – ADC (mV, V, mA, T/C)
AR	5	CB100505-02	A	PCB ASSY – P/S (W/24 Vdc PWR)
AR	4	CB100505-01	A	PCB ASSY – P/S CARRIER
AR	3	ZA100208-01	D	ENCLOSURE ASSY
1	2	ZA100207-01	D	DOOR ASSY
REF	1	ZM100134-01	D	RECORDER ASSY DRAWING
-01 QTY.	ITEM NO.	PART NO.	DWG SIZE	DESCRIPTION
PARTS LIST				

Figure 11–11. ZM100133: Recorder assembly parts list (sheet 1 of 2)

AR	68	RZ000501-26	--	RESISTOR – 50-OHM SHUNT WITHOUT LUGS
AR	67	CB100537-01	--	PCB ASSY – SV180-MX60/MM120 INTERFACE
AR	66	ZA100214-01	--	ENCLOSURE ASSY – SV180-MX60/MM120 INTERFACE
AR	65	CB100515-04	A	PCB ASSY – 18-30 Vdc P/S W/ EMI/RFI & 24V XMTR POWER
AR	64	CB100515-03	A	PCB ASSY – 18-30 Vdc P/S W/ EMI/RFI
AR	63	CB100515-02	A	PCB ASSY – 90-125 Vdc P/S W/ EMI/RFI & 24V XMTR POWER
AR	62	CB100515-01	A	PCB ASSY – 90-125 Vdc P/S W/ EMI/RFI
AR	61	CB100505-04	A	PCB ASSY – AC P/S CARRIER W/ EMI/RFI & 24V XMTR POWER
AR	60	CB100505-03	A	PCB ASSY – AC P/S CARRIER W/ EMI/RFI
4	59	HW031004-00	A	NUT – #4-40 HEX STD
1	58	CL100010-01	--	CABLE TIE – 4"
REF	57	PI100163-01	--	SOFTWARE – SV180 APPLICATION
REF	56	PI100162-01	--	SOFTWARE – SV180 MONITOR
REF	55	PA100232-04	--	FLASH DISK – 350 MBYTE
REF	54	PA100232-03	--	FLASH DISK – 128 MBYTE
REF	53	PA100232-02	--	FLASH DISK – 64 MBYTE
REF	52	PA100232-01	--	FLASH DISK – 16 MBYTE
AR	51	LB100623-05	C	LABEL – REAR TERMINAL (O65-80)
-01 QTY.	ITEM NO.	PART NO.	DWG SIZE	DESCRIPTION
PARTS LIST				

Figure 11–12. ZM100133: Recorder assembly parts list (sheet 2 of 2)

	AR	50	LB100623-04	C	LABEL – REAR TERMINAL (O49-64)
	AR	49	LB100623-03	C	LABEL – REAR TERMINAL (O33-48)
	AR	48	LB100623-02	C	LABEL – REAR TERMINAL (I65-80)
	AR	47	LB100623-01	C	LABEL – REAR TERMINAL (I49-64)
	REF	46	MO100217-01	--	SOFTWARE V & V
	REF	45	2L0198EEPRI1	--	EMC TEST REPORT
	REF	44	MO100205-01	--	SEISMIC TEST REPORT
		43			
	1	42	MO100202-01	--	USER MANUAL
	1	41	PI100158-01	--	SOFTWARE – PROVIEW PLUS
	AR	40	ZB100997C02	B	ASSY - BLANKING PANEL
	AR	39	ZB100997C01	B	ASSY – BLANKING PANEL
	4	38	HW015004C04	A	WASHER – #4 INTERNAL LOCK
	AR	37	HW011404C07	A	SCREW – #4-40 x 7/16, BH (PWR BARRIER)
	AR	36	MP102332C01	B	COVER – TERMINAL (PWR BARRIER)
	AR	35	SP100200C22	A	SPACER – 0.25 HEX x 0.75 LG (PWR BARRIER)
	AR	34	HW011404C16	A	SCREW – #4-40 x 1, BH (PWR BARRIER)
	2	33	LB100265-03	B	LABEL – DANGER
		32			
		31			
		30			
<4>	REF	29	PC100001C01	--	POWER CORD ASSY – IEC 320
<4>	REF	28	ZB100668C01	--	POWER CORD ASSY – 8 FT LUGGED
		27			
	AR	26	ZB100134C01	B	RESISTOR ASSY – 50-OHM SHUNT
<3>	1	25	MP102612C01	C	PLATE – JACKSCREW RETAINER
	1	24	KT100313C02	B	JACKSCREW KIT
	1	23	LB100478-01	A	LABEL – MADE IN USA
	1	22	LB100655-01	A	NAME PLATE – SV SERIES, CE MARK
	REF	21	DM100172-01	D	REAR TERMINAL ASSIGNMENTS
	REF	20	DM100171-01	D	INSTALLATION DIMENSIONS
		19			
	1	18	MP102607C01	C	SEAL – PANEL
	1	17	LB100628C01	--	LABEL – REALTIME
	AR	16	CB100504C01	A	PCB ASSY – INPUT POWER (BARRIER)
	2	15	HW011406C08	A	SCREW – #6-32 x 1/2, BH (DOOR ANCHOR)
	1	14	LB100654-01	--	LABEL – CAUTION MARK
		13			
		12			
	AR	11	ZB100980C03	D	CHASSIS ASSY (FLOPPY/PC CARD)
		10			
	AR	9	ZB100980C01	D	CHASSIS ASSY (FLOPPY ONLY)
	AR	8	CB100507C01	A	PCB ASSY – GPIO
	AR	7	CB100506C02	A	PCB ASSY – ADC (mV, V, mA, T/C, RTD)
	AR	6	CB100506C01	A	PCB ASSY – ADC (mV, V, mA, T/C)
		5			
		4			
	1	3	ZA100208C01	D	ENCLOSURE ASSY
	1	2	ZA100207C01	D	DOOR ASSY
	REF	1	ZM100134-01	D	RECORDER ASSY DRAWING
	QTY.	ITEM NO.	PART NO.	DWG SIZE	DESCRIPTION
	PARTS LIST				

Figure 11–13. ZM100133C: Recorder assembly parts list (sheet 1 of 2)

	QTY.	ITEM NO.	PART NO.	DWG SIZE	DESCRIPTION
<4>	REF	73	PA100259-07	--	1.0-GBYTE COMPACT FLASH CARD
<4>	REF	72	PA100259-06	--	512-MBYTE COMPACT FLASH CARD
<4>	REF	71	PA100259-05	--	256-MBYTE COMPACT FLASH CARD
<4>	REF	70	PA100259-04	--	192-MBYTE COMPACT FLASH CARD
<4>	REF	69	PA100259-03	--	128-MBYTE COMPACT FLASH CARD
<4>	REF	68	PA100259-02	--	64-MBYTE COMPACT FLASH CARD
<4>	REF	67	PA100259-01	--	32-MBYTE COMPACT FLASH CARD
<4>	REF	66	PA100260-01	--	COMPACT FLASH TO PCMCIA TYPE II ADAPTER
	AR	65	CB100515C04	A	PCB ASSY – 18-30 Vdc P/S W/ EMI/RFI & 24V XMTR POWER
	AR	64	CB100515C03	A	PCB ASSY – 18-30 Vdc P/S W/ EMI/RFI
	AR	63	CB100515C02	A	PCB ASSY – 90-125 Vdc P/S W/ EMI/RFI & 24V XMTR POWER
	AR	62	CB100515C01	A	PCB ASSY – 90-125 Vdc P/S W/ EMI/RFI
	AR	61	CB100505C04	A	PCB ASSY – AC P/S CARRIER W/ EMI/RFI & 24V XMTR POWER
	AR	60	CB100505C03	A	PCB ASSY – AC P/S CARRIER W/ EMI/RFI
	4	59	HW031004C00	A	NUT – #4-40 HEX STD
	1	58	CL100010C01	--	CABLE TIE – 4"
	REF	57	PI100163-01	--	SOFTWARE – SV180 APPLICATION
	REF	56	PI100162-01	--	SOFTWARE – SV180 MONITOR
		55			
		54			
		53			
		52			
	AR	51	LB100623-05	C	LABEL – REAR TERMINAL (O65-80)

PARTS LIST

Figure 11–14. ZM100133C: Recorder assembly parts list (sheet 2 of 2)

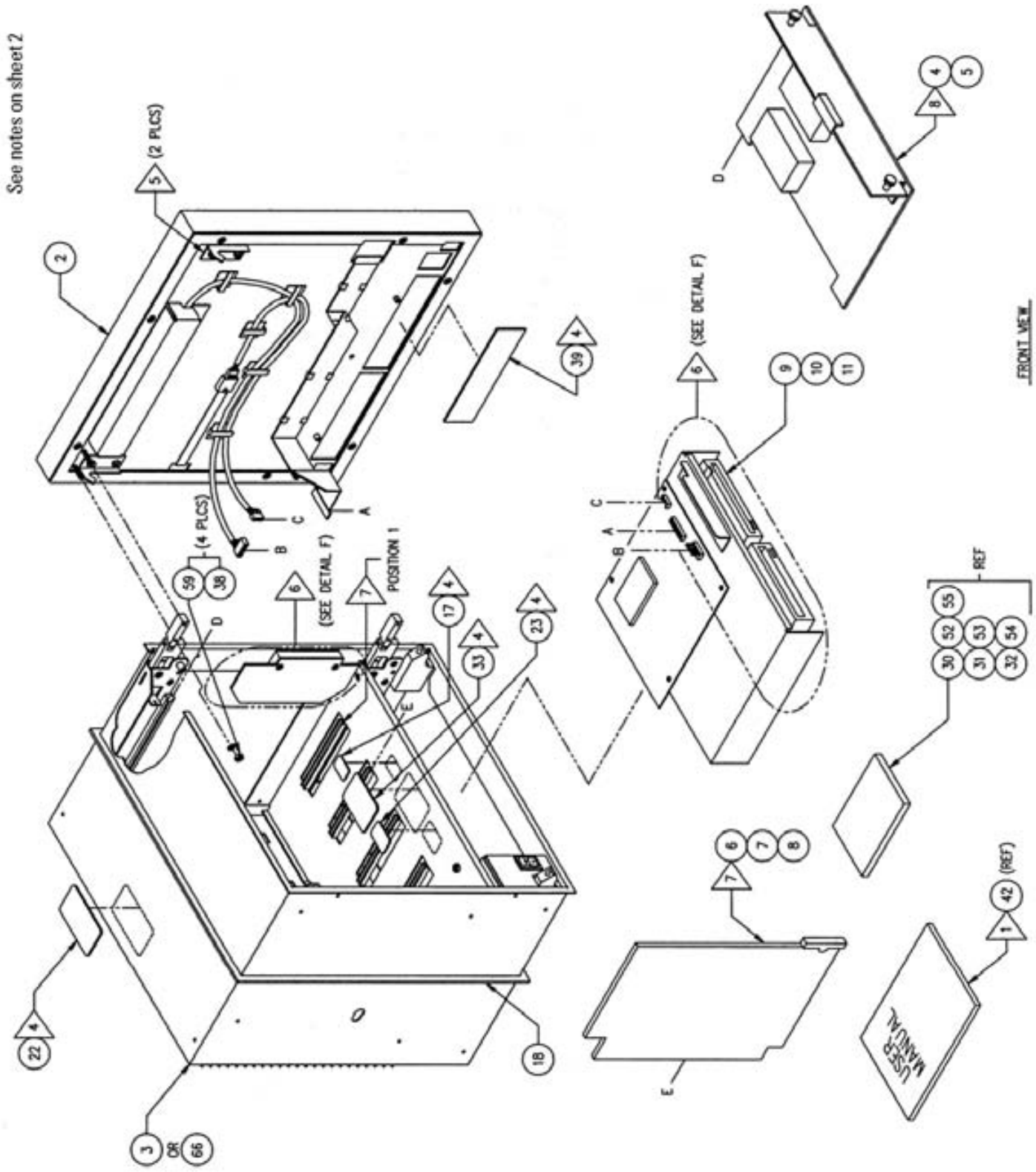

Figure 11–15. ZM100134: Recorder assembly drawing (sheet 1 of 4)

NOTES:

1. PLACE MANUAL (ITEM 42) INTO SHIPPING CONTAINER AS REQUIRED.
2. APPLY APPROPRIATE ADHESIVE TO ALL THREADS PER PROCEDURE PR100121-01, UNLESS OTHERWISE NOTED.
3. DO NOT APPLY ADHESIVE TO THESE FASTENERS.
4. CLEAN SURFACE WITH ALCOHOL BEFORE APPLYING COMPONENT.
5. ADJUST UPPER DOOR CLAMPS (PART OF ITEM 2) TO PRODUCE UNIFORM COMPRESSION OF THE PERIPHERY GASKETING AGAINST THE ENCLOSURE BEZEL (PART OF ITEM 3) WITH THE SCREWS (ITEM 15) TIGHTENED IN PLACE PER DETAIL G.
6. ROUTE THE ROUND CABLES (PART OF ITEM 2) AROUND THE BLOCK ATTACHED TO THE ENCLOSURE WALL AND BETWEEN THE WALL AND FLAT CABLE GUIDE. PUSH THE CABLES INTO THE NOTCH AT THE CORNER OF THE CARD GUIDE TRAY (PART OF ITEM 3 OR ITEM 66). INSERT THE CHASSIS (ITEMS 9-14) INTO THE ENCLOSURE BUT STOP APPROXIMATELY 2 INCHES SHORT OF ENGAGEMENT WITH MOTHERBOARD PCB. INSTALL THE ROUND CABLES AS SHOWN IN DETAIL F & INSTALL THE CABLE TIE (ITEM 58) TO SECURE THE ROUND CABLES TO THE ENCLOSURE. INSTALL THE FLAT VIDEO CABLE TO THE CPU CONNECTOR AS SHOWN IN THE SAME DETAIL.
7. INSERT THE APPROPRIATE ADC PCB OR GPIO PCB OR MX60/MM120 INTERFACE PCB (ITEMS 6-8 & 67) INTO THE GUIDES PROVIDED IN THE ENCLOSURE. POSITION "1" IS DEFINED AS THE ONE NEXT TO THE DOOR HINGE. POSITIONS 2 THRU 5 PROGRESS SEQUENTIALLY TO THE LEFT.
8. INSERT THE POWER SUPPLY PCB ASSY (ITEMS 4 OR 5) INTO THE GUIDES PROVIDED IN THE ENCLOSURE. SEAT THE PCB INTO THE MOTHERBOARD PCB CONNECTORS AND TIGHTEN THE PANEL SCREWS ON EACH END OF THE PCB BRACKET. DO NOT OVER TIGHTEN THE SCREWS.
9. APPLICATION OF THE BARRIER POWER INPUT PCB (ITEM 16) REQUIRES REMOVAL OF THE IEC CORDSET CLAMP THAT IS ATTACHED TO THE REAR OF THE ENCLOSURE. DISCARD THE CLAMP AND RE-INSTALL THE SCREWS SECURING THE IEC CONNECTOR. INSTALL THE LONG SCREWS (ITEM 34) THRU THE SELF-CLINCHING STANDOFFS FROM THE INSIDE OF THE ENCLOSURE & TIGHTEN. IT WILL BE NECESSARY TO REMOVE THE SWITCH ENCLOSURE TO OBTAIN ACCESS TO THE STANDOFFS. INSTALL THE POWER INPUT PCB BY MATING THE BLADES OF THE IEC CONNECTOR WITH THE BLADE RECEPTACLES SOLDERED TO THE BACKSIDE OF THE PCB, TAKING CARE NOT TO BEND THE RECEPTACLES.
10. IF THE IEC POWER CORD (ITEM 29) IS PRESENT, INSERT THE CORDSET INTO THE RECEPTACLE ATTACHED TO THE ENCLOSURE AND TIGHTEN THE CORDSET CLAMPING SCREW TO PREVENT CORDSET DISENGAGEMENT.

Figure 11–16. ZM100134: Recorder assembly drawing (sheet 2 of 4)

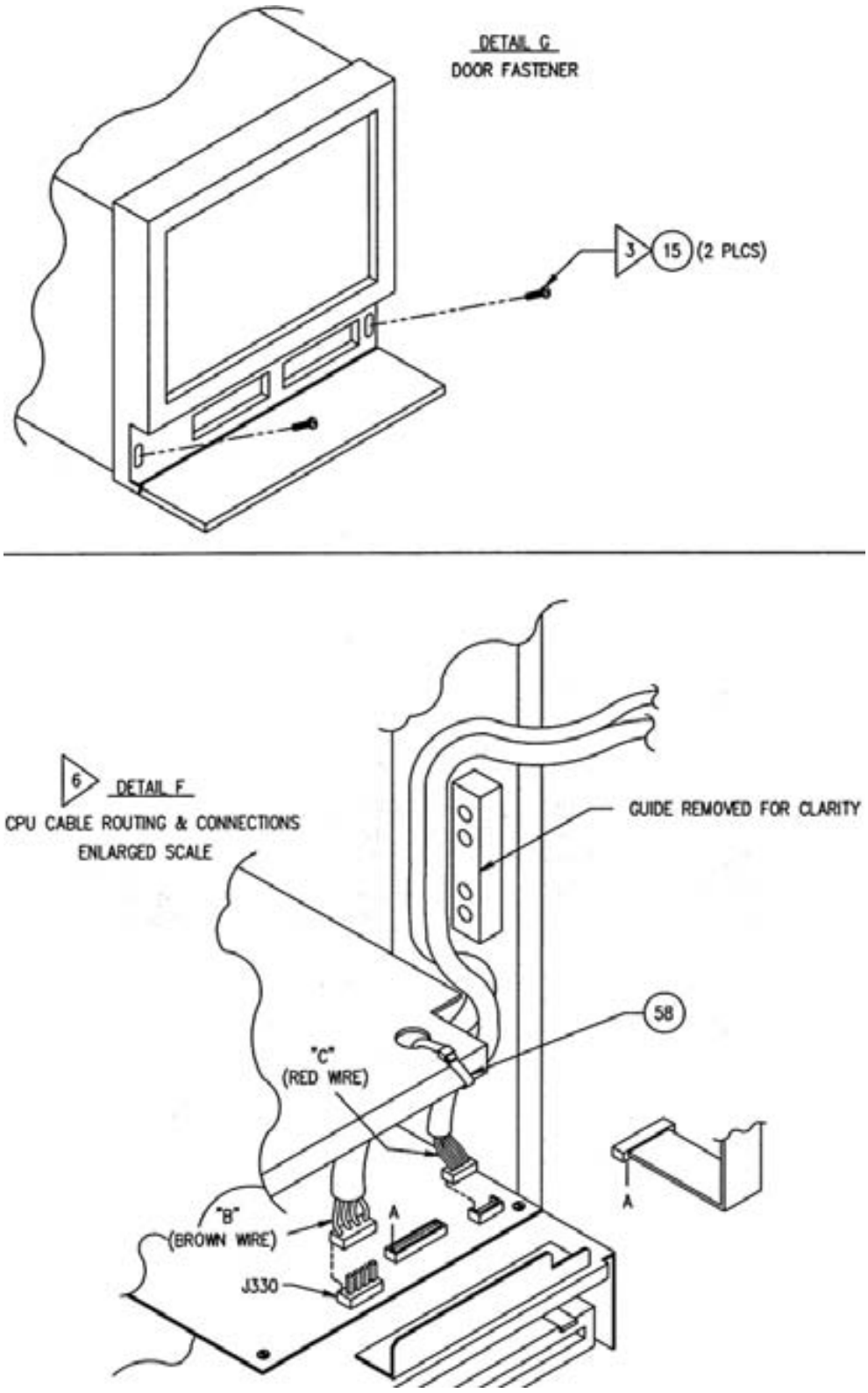

Figure 11–17. ZM100134: Recorder assembly drawing (sheet 3 of 4)

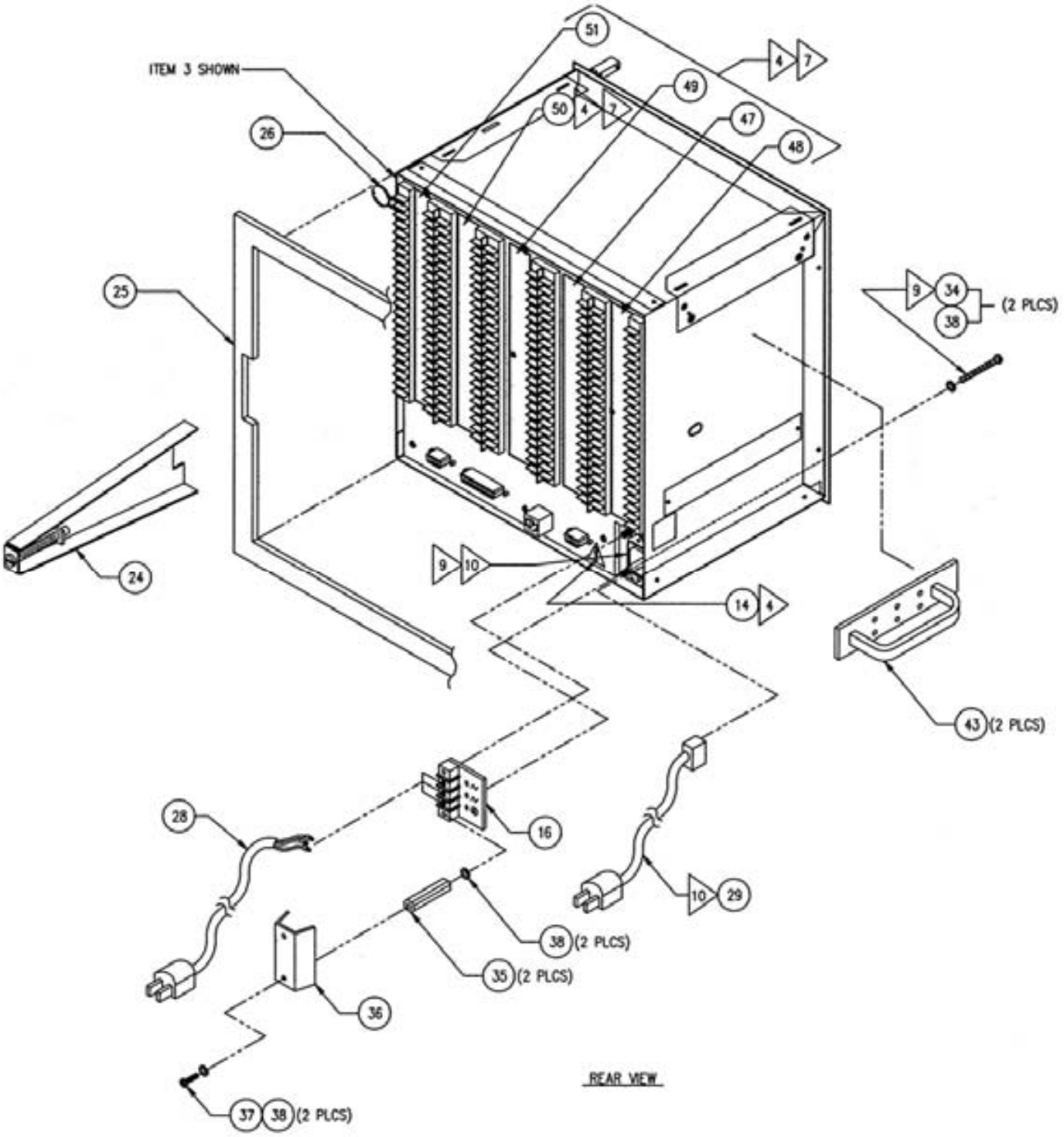

Figure 11–18. ZM100134: Recorder assembly drawing (sheet 4 of 4)

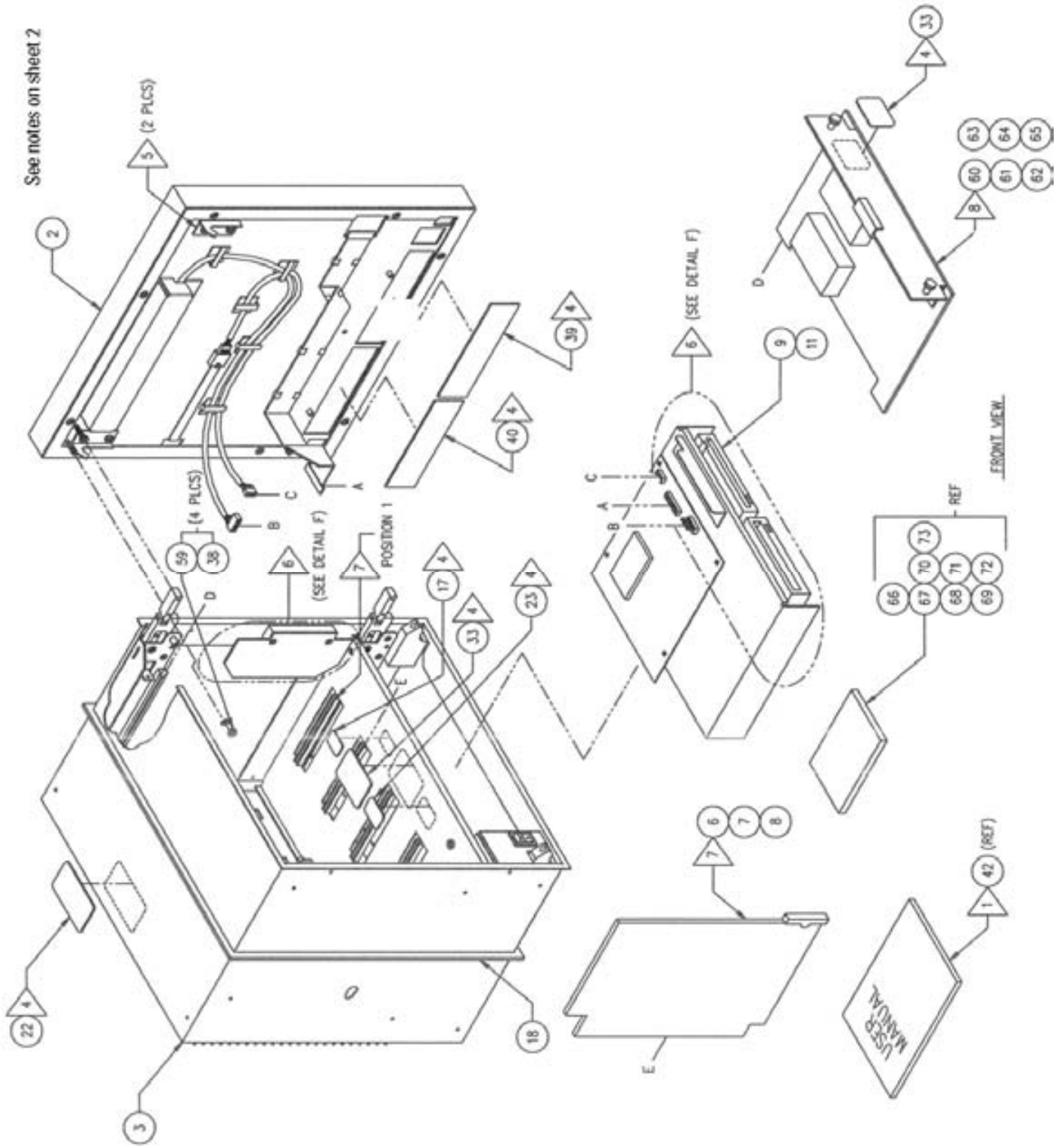

Figure 11–19. ZM100134C: Recorder assembly drawing (sheet 1 of 4)

NOTES:

1. PLACE MANUAL (ITEM 42) INTO SHIPPING CONTAINER AS REQUIRED.
2. APPLY APPROPRIATE ADHESIVE TO ALL THREADS PER PROCEDURE PR100121-01, UNLESS OTHERWISE NOTED.
3. DO NOT APPLY ADHESIVE TO THESE FASTENERS.
4. CLEAN SURFACE WITH ALCOHOL BEFORE APPLYING COMPONENT.
5. ADJUST UPPER DOOR CLAMPS (PART OF ITEM 2) TO PRODUCE UNIFORM COMPRESSION OF THE PERIPHERY GASKETING AGAINST THE ENCLOSURE BEZEL (PART OF ITEM 3) WITH THE SCREWS (ITEM 15) TIGHTENED IN PLACE PER DETAIL G.
6. ROUTE THE ROUND CABLES (PART OF ITEM 2) AROUND THE BLOCK ATTACHED TO THE ENCLOSURE WALL AND BETWEEN THE WALL AND FLAT CABLE GUIDE. PUSH THE CABLES INTO THE NOTCH AT THE CORNER OF THE CARD GUIDE TRAY (PART OF ITEM 3). INSERT THE CHASSIS (ITEMS 9 OR 11) INTO THE ENCLOSURE BUT STOP APPROXIMATELY 2 INCHES SHORT OF ENGAGEMENT WITH MOTHERBOARD PCB. INSTALL THE ROUND CABLES AS SHOWN IN DETAIL F & INSTALL THE CABLE TIE (ITEM 58) TO SECURE THE ROUND CABLES TO THE ENCLOSURE. INSTALL THE FLAT VIDEO CABLE TO THE CPU CONNECTOR AS SHOWN IN THE SAME DETAIL.
7. INSERT THE APPROPRIATE ADC PCB OR GPIO PCB (ITEMS 6-8) INTO THE GUIDES PROVIDED IN THE ENCLOSURE. POSITION "1" IS DEFINED AS THE ONE NEXT TO THE DOOR HINGE. POSITIONS 2 THRU 5 PROGRESS SEQUENTIALLY TO THE LEFT.
8. INSERT THE POWER SUPPLY PCB ASSY (ITEMS 60, 61, 62, 63, 64 OR 65) INTO THE GUIDES PROVIDED IN THE ENCLOSURE. SEAT THE PCB INTO THE MOTHERBOARD PCB CONNECTORS AND TIGHTEN THE PANEL SCREWS ON EACH END OF THE PCB BRACKET. DO NOT OVER TIGHTEN THE SCREWS.
9. APPLICATION OF THE BARRIER POWER INPUT PCB (ITEM 16) REQUIRES REMOVAL OF THE IEC CORDSET CLAMP THAT IS ATTACHED TO THE REAR OF THE ENCLOSURE. DISCARD THE CLAMP AND RE-INSTALL THE SCREWS SECURING THE IEC CONNECTOR. INSTALL THE LONG SCREWS (ITEM 34) THRU THE SELF-CLINCHING STANDOFFS FROM THE INSIDE OF THE ENCLOSURE & TIGHTEN. IT WILL BE NECESSARY TO REMOVE THE SWITCH ENCLOSURE TO OBTAIN ACCESS TO THE STANDOFFS. INSTALL THE POWER INPUT PCB BY MATING THE BLADES OF THE IEC CONNECTOR WITH THE BLADE RECEPTACLES SOLDERED TO THE BACKSIDE OF THE PCB, TAKING CARE NOT TO BEND THE RECEPTACLES.
10. IF THE IEC POWER CORD (ITEM 29) IS PRESENT, INSERT THE CORDSET INTO THE RECEPTACLE ATTACHED TO THE ENCLOSURE AND TIGHTEN THE CORDSET CLAMPING SCREW TO PREVENT CORDSET DISENGAGEMENT.

Figure 11–20. ZM100134C: Recorder assembly drawing (sheet 2 of 4)

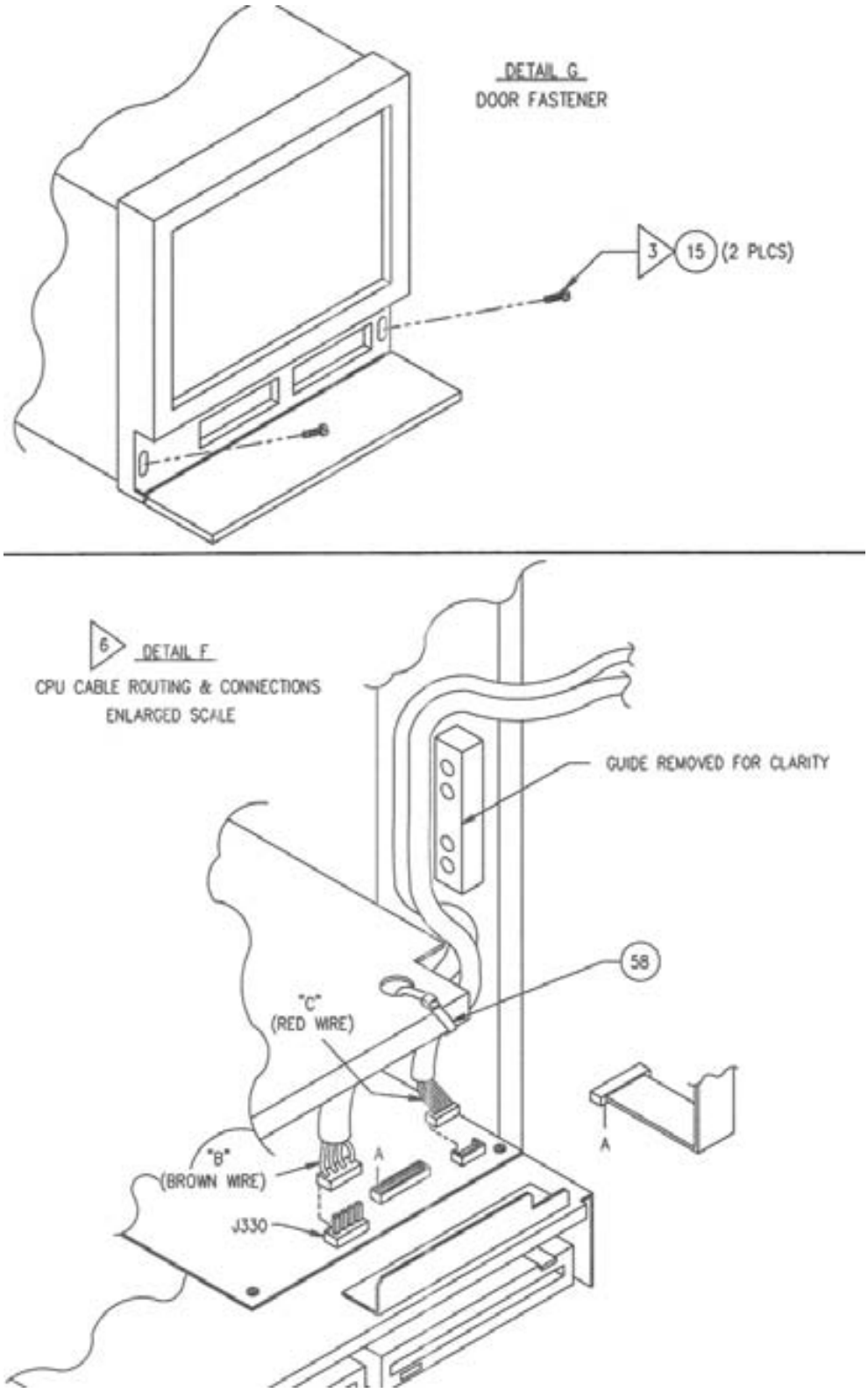

Figure 11–21. ZM100134C: Recorder assembly drawing (sheet 3 of 4)

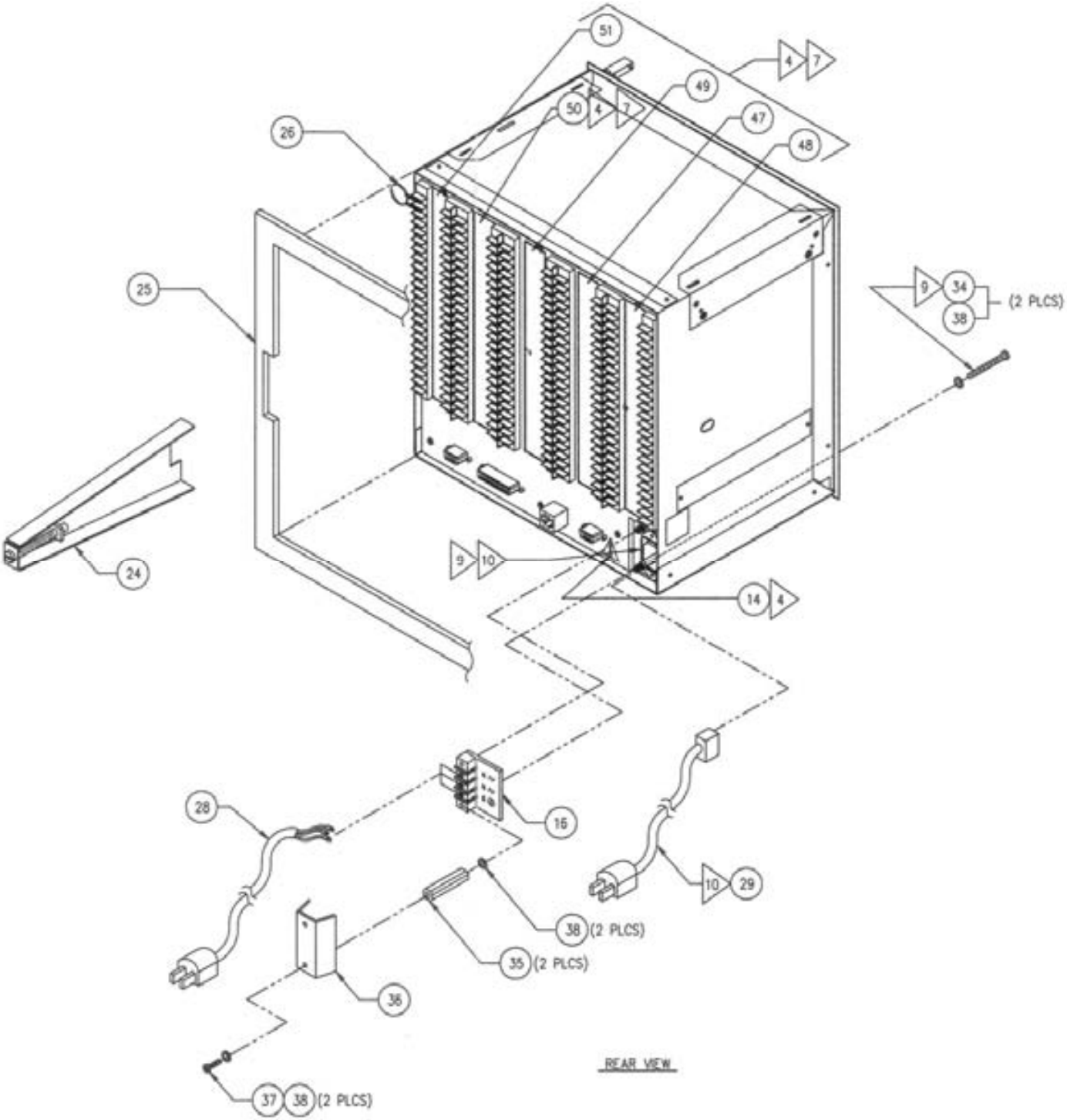

Figure 11–22. ZM100134C: Recorder assembly drawing (sheet 4 of 4)

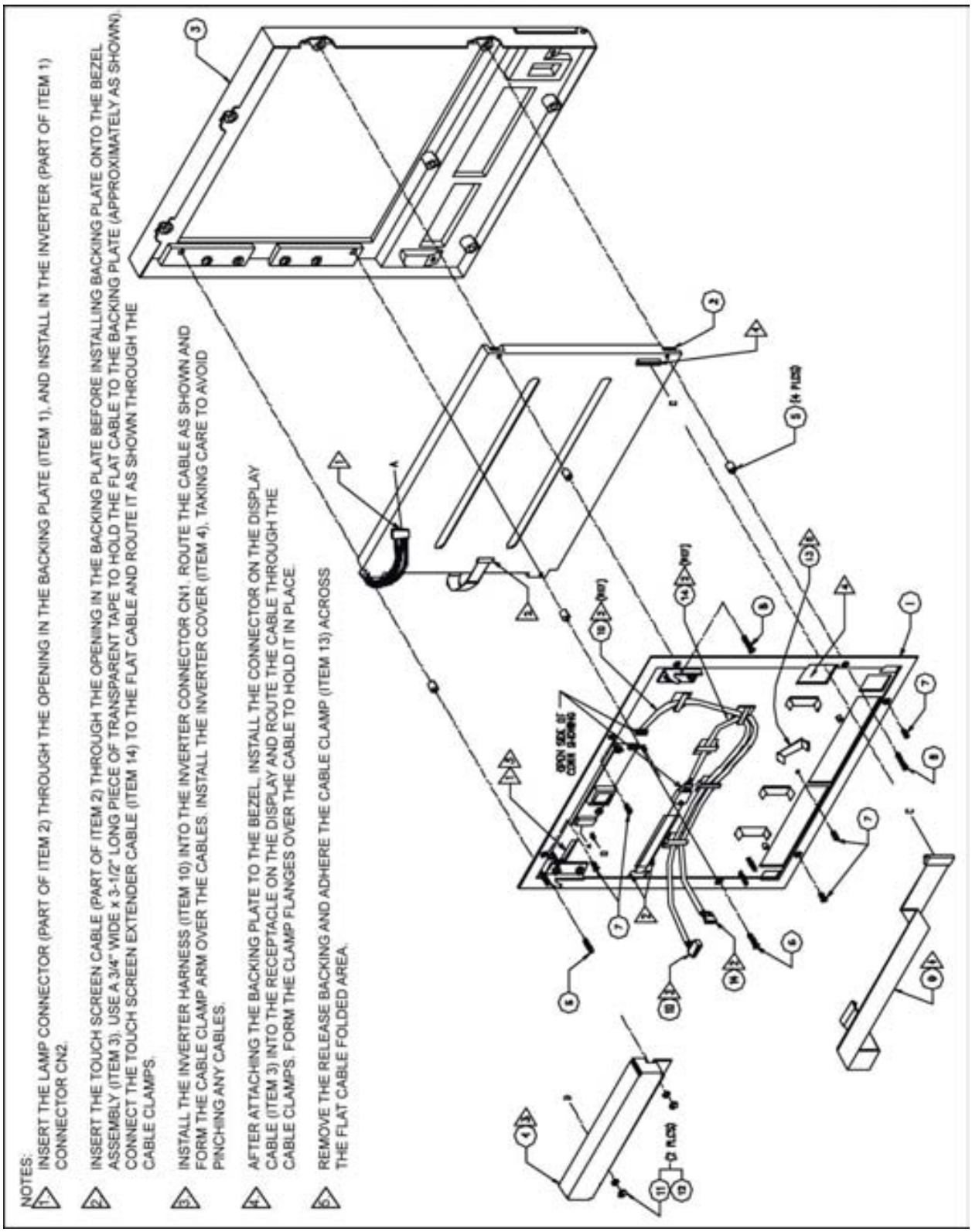
NOTES:
1. INSERT THE LAMP CONNECTOR (PART OF ITEM 2) THROUGH THE OPENING IN THE BACKING PLATE (ITEM 1), AND INSTALL IN THE INVERTER (PART OF ITEM 1) CONNECTOR CN2.
2. INSERT THE TOUCH SCREEN CABLE (PART OF ITEM 2) THROUGH THE OPENING IN THE BACKING PLATE BEFORE INSTALLING BACKING PLATE ONTO THE BEZEL ASSEMBLY (ITEM 3). USE A 3/4" WIDE x 3-1/2" LONG PIECE OF TRANSPARENT TAPE TO HOLD THE FLAT CABLE TO THE BACKING PLATE (APPROXIMATELY AS SHOWN). CONNECT THE TOUCH SCREEN EXTENDER CABLE (ITEM 14) TO THE FLAT CABLE AND ROUTE IT AS SHOWN THROUGH THE CABLE CLAMPS.
3. INSTALL THE INVERTER HARNESS (ITEM 10) INTO THE INVERTER CONNECTOR CN1. ROUTE THE CABLE AS SHOWN AND FORM THE CABLE CLAMP ARM OVER THE CABLES. INSTALL THE INVERTER COVER (ITEM 4), TAKING CARE TO AVOID PINCHING ANY CABLES.
4. AFTER ATTACHING THE BACKING PLATE TO THE BEZEL, INSTALL THE CONNECTOR ON THE DISPLAY CABLE (ITEM 3) INTO THE RECEPTACLE ON THE DISPLAY AND ROUTE THE CABLE THROUGH THE CABLE CLAMPS. FORM THE CLAMP FLANGES OVER THE CABLE TO HOLD IT IN PLACE.
5. REMOVE THE RELEASE BACKING AND ADHERE THE CABLE CLAMP (ITEM 13) ACROSS THE FLAT CABLE FOLDED AREA.

Figure 11–23. ZA100207: Door assembly (sheet 1 of 1)

Part number: **ZA100207-01** **DOOR ASSY**

Itm	Part Number	Description	Qty/Per	UOM
001	ZB100991-01	ASSY - DISPLAY BACKING PLATE	1.	EA
002	ZB100984-01	DISPLAY/TOUCHSCREEN ASSY	1.	EA
003	ZB100985-01	BEZEL / DOOR ASSY	1.	EA
004	MP102585-01	COVER-INVERTER	1.	EA
005	SP100100-17	SPACER,RND,BRASS-SEE EXT DISC	4.	EA
006	HW011204-09	SCREW-#4-40 X 9/16,FH 100	2.	EA
007	FA100135-01	SCREW - #4 X 0.312,FH SELF-TAP	5.	EA
008	FA100136-01	SCREW - #4 X 0.688,FH SELF-TAP	2.	EA
009	ZB100992-01	MOD - DISPLAY HARNESS	1.	EA
010	HN101198-01	HARNESS - INVERTER SUPPLY	1.	EA
011	HW013104-00	NUT-#4-40,HEX STD	2.	EA
012	HW015004-05	WASHER-#4,LOCK STAR,EXT	2.	EA
013	CL100017-02	CLAMP - CABLE, FLAT ALUM(3/4")	1.	EA
014	HN101203-01	HARNESS - TOUCHSCREEN EXTENDER	1.	EA

Figure 11–24. ZA100207-01: Door assembly parts list (sheet 1 of 1)

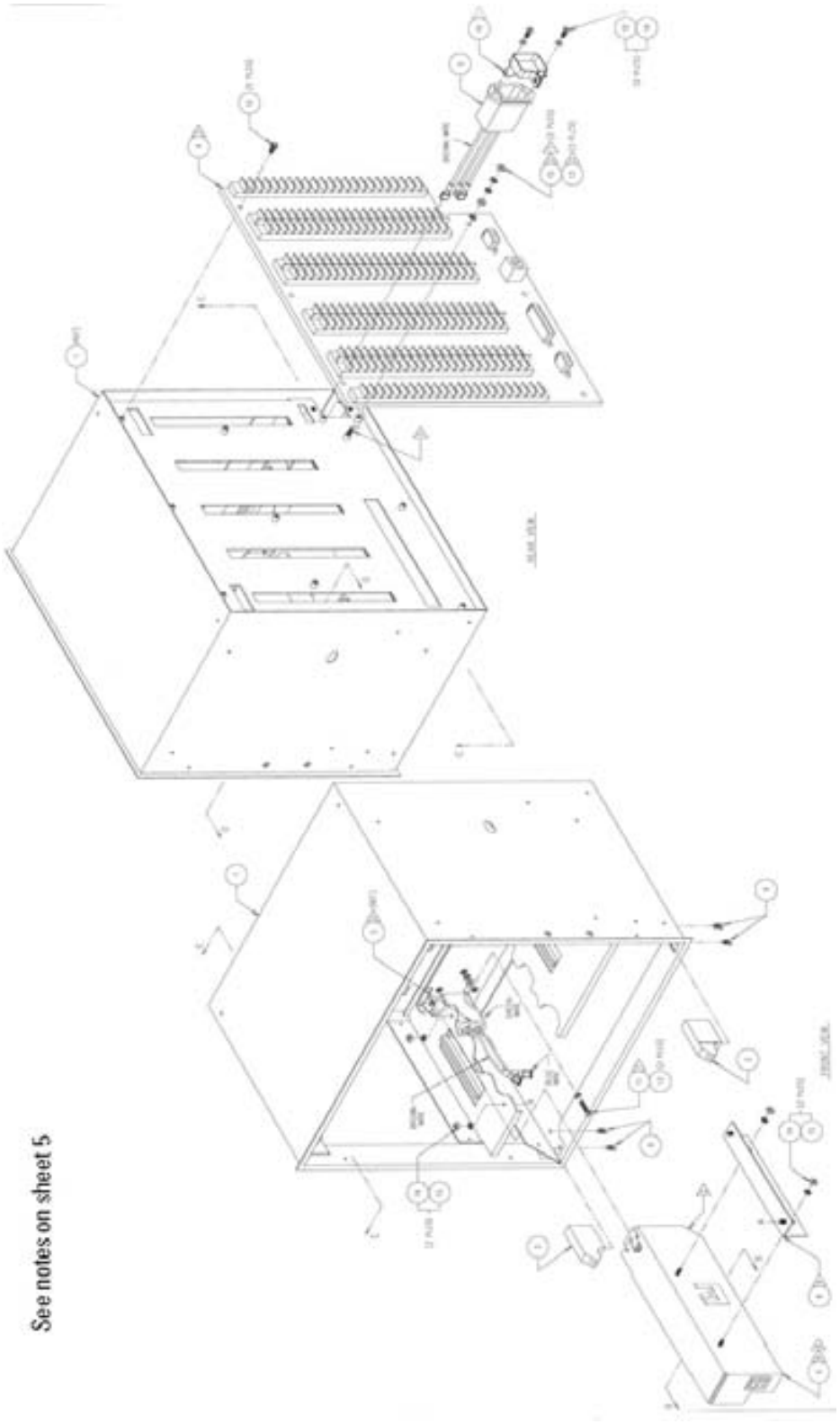

Figure 11–25. ZA100208: Enclosure assembly (sheet 1 of 5)

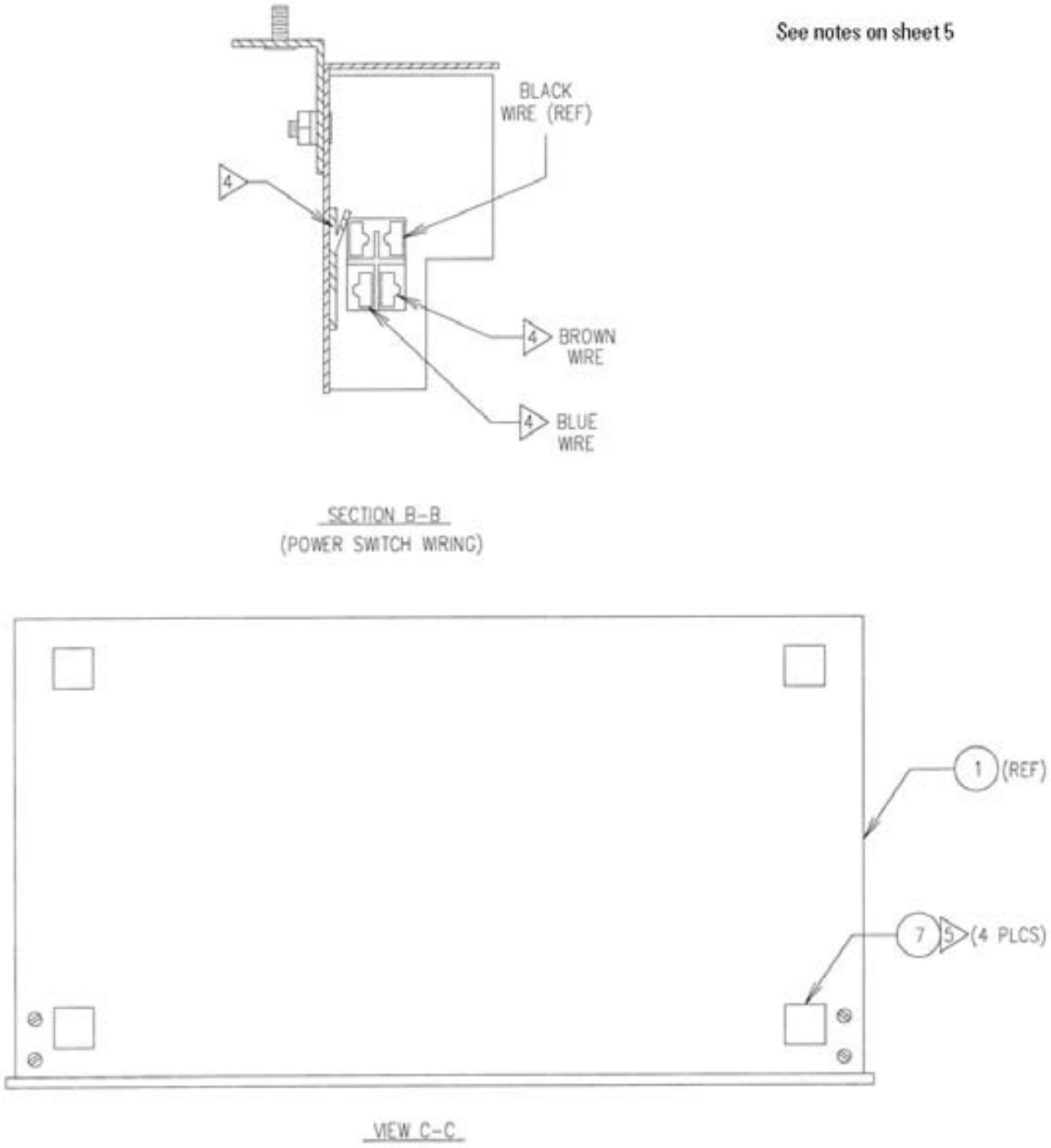

Figure 11–26. ZA100208: Enclosure assembly (sheet 2 of 5)

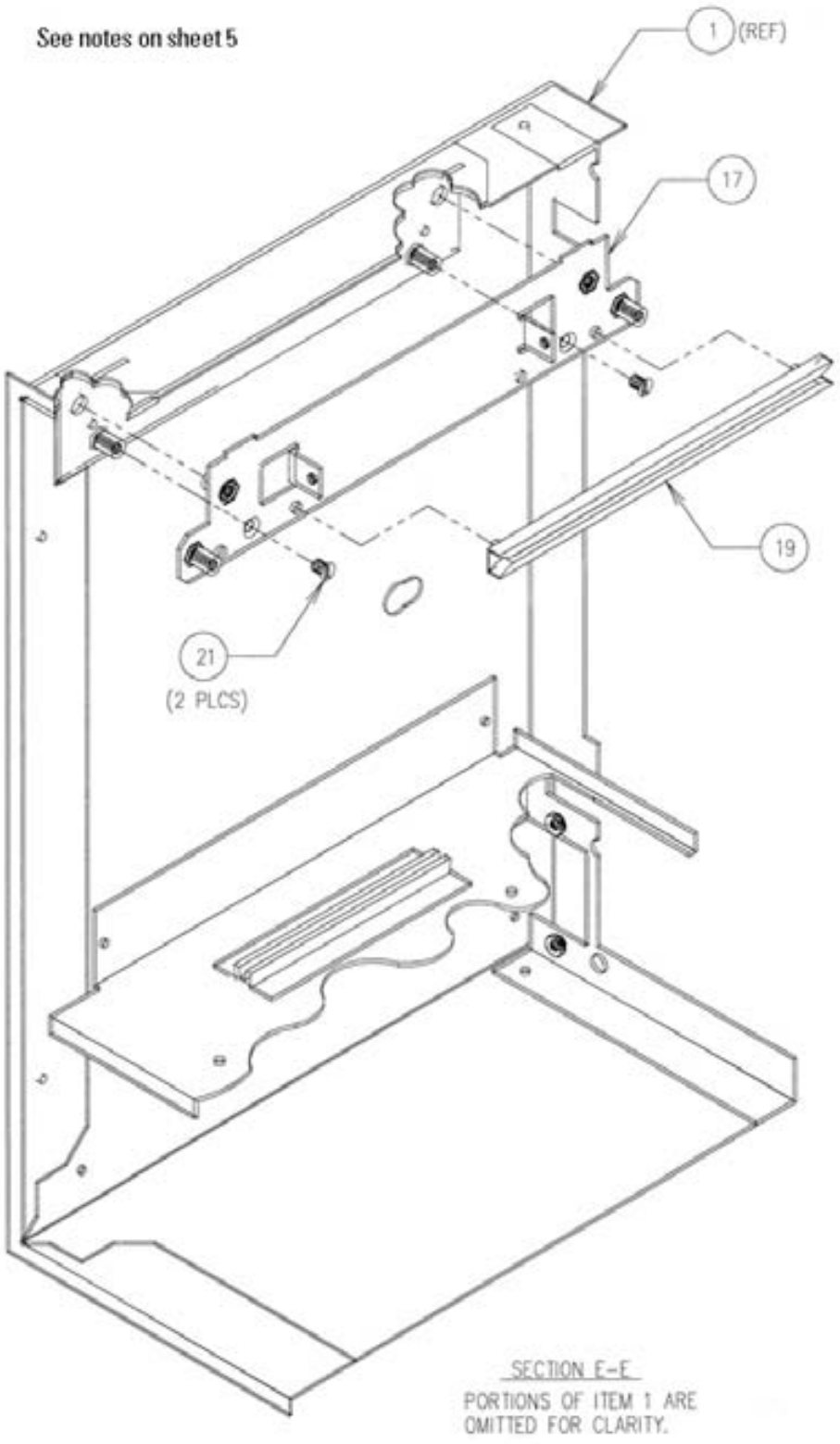

Figure 11–27. ZA100208: Enclosure assembly (sheet 3 of 5)

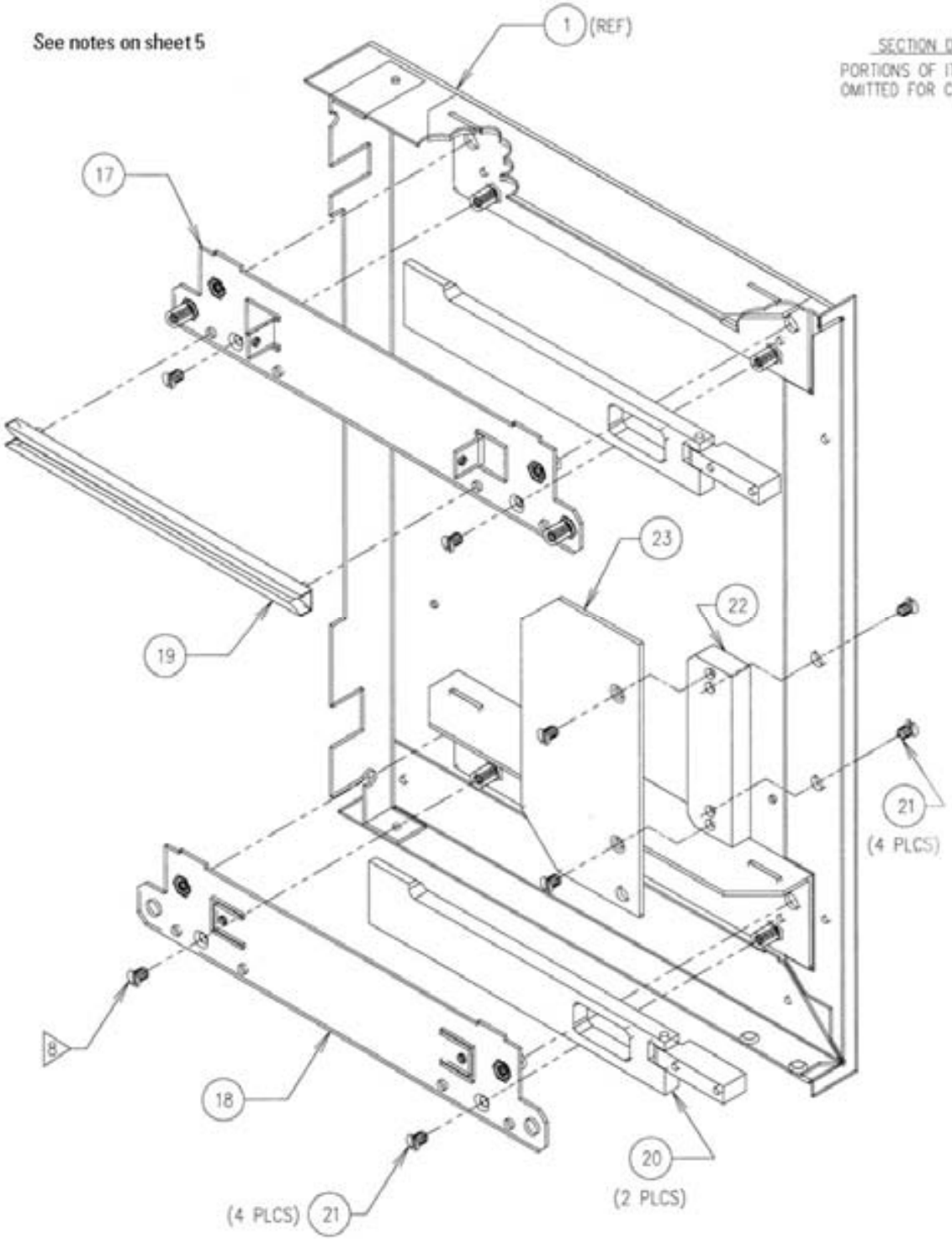

Figure 11–28. ZA100208: Enclosure assembly (sheet 4 of 5)

NOTES:

1. INSTALL POWER INPUT (ITEM 5), WITH CORDSET LOCK (ITEM 16). DO NOT TIGHTEN CLAMPING SCREW ON ITEM 16.
2. INSERT HARDWARE (ITEMS 11 & 13) THRU THE LUG RING OF GREEN WIRE OF ITEM 5 & SECURE THE LUG TO THE ENCLOSURE REAR (SCREW GOES THRU THE STANDOFF). POSITION WIRE SO THAT NOTCHED CORNER OF SWITCH MODULE (ITEM 6) WILL NOT PINCH IT.
3. INSTALL THE MOTHERBOARD PCB (ITEM 4) ONTO THE REAR OF THE ENCLOSURE. THE LONG SCREW, EXTENDING THRU THE ENCLOSURE REAR PANEL, WILL PASS THRU THE PCB AT THE INDICATED HOLE. INSTALL THE HARDWARE (ITEMS 13 & 15) AS SHOWN BUT DO NOT OVER TIGHTEN. HANDLE PCB ACCORDING TO WESTRONICS PROCEDURES FOR HANDLING STATIC SENSITIVE DEVICES.
4. THE POWER SWITCH MODULE (ITEM 6) SHOULD BE INSTALLED IN THE FOLLOWING RECOMMENDED SEQUENCE:
   A. INSTALL THE POWER CONNECTOR BROWN & BLUE WIRE LUGS ONTO THE REAR OF THE POWER SWITCH AS DESCRIBED IN SECTION B-B. NOTE ORIENTATION OF BLACK WIRE THAT IS ALREADY INSTALLED ON THE SWITCH. INSTALL BROWN AND BLUE WIRE LUGS WITH FLAT SIDES FACING EACH OTHER.
   B. INSERT THE BROWN & BLUE WIRES INTO THE CABLE CLAMP ON THE MODULE SIDE.
   C. INSTALL THE POWER MODULE INTO THE ENCLOSURE, INSURE THE MODULE CONNECTOR MATES WITH THE HEADER ON THE MOTHERBOARD.
   D. INSTALL THE POWER SWITCH BRACKET (ITEM 8) OVER THE STUDS IN THE POWER MODULE SIDE & THRU THE HOLES IN THE CARD GUIDE TRAY FLOOR. PUSH THE SWITCH MODULE AGAINST THE ENCLOSURE WALL & FLOOR, THEN TIGHTEN THE HARDWARE (ITEM 15).
5. PLACE RUBBER FEET (ITEM 7) APPROX AS SHOWN. DO NOT COVER SCREW HEADS IN ENCLOSURE FLOOR.
   6. APPLY THREAD SEALANT TO FASTENERS PER PROCEDURE PR100121-01, UNLESS OTHERWISE NOTED.
7. DO NOT APPLY THREAD SEALANT TO THIS FASTENER.
8. INSTALL SCREWS (ITEM 21) HOLDING HINGE SLIDE TRAPS (ITEMS 17 & 18) BEFORE INSTALLING POWER SWITCH MODULE (ITEM 6). THE MODULE COVERS THE SCREW ACCESS HOLE IN THE ENCLOSURE WALL.

Figure 11–29. ZA100208: Enclosure assembly (sheet 5 of 5)

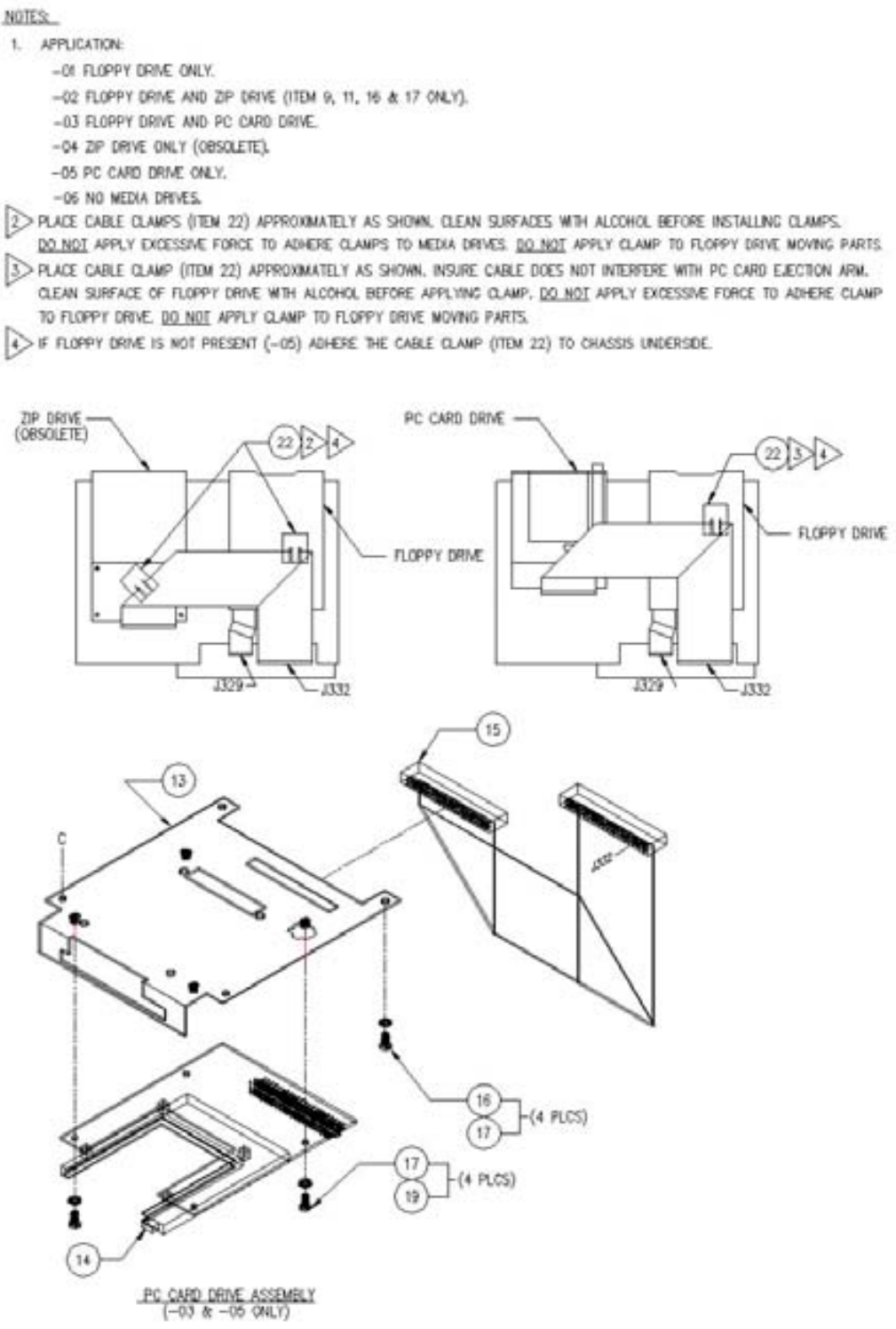
NOTES:
1. APPLICATION:
-01 FLOPPY DRIVE ONLY.
-02 FLOPPY DRIVE AND ZIP DRIVE (ITEM 9, 11, 16 & 17 ONLY).
-03 FLOPPY DRIVE AND PC CARD DRIVE.
-04 ZIP DRIVE ONLY (OBSOLETE).
-05 PC CARD DRIVE ONLY.
-06 NO MEDIA DRIVES.
2 PLACE CABLE CLAMPS (ITEM 22) APPROXIMATELY AS SHOWN. CLEAN SURFACES WITH ALCOHOL BEFORE INSTALLING CLAMPS. DO NOT APPLY EXCESSIVE FORCE TO ADHERE CLAMPS TO MEDIA DRIVES. DO NOT APPLY CLAMP TO FLOPPY DRIVE MOVING PARTS.
3 PLACE CABLE CLAMP (ITEM 22) APPROXIMATELY AS SHOWN. INSURE CABLE DOES NOT INTERFERE WITH PC CARD EJECTION ARM. CLEAN SURFACE OF FLOPPY DRIVE WITH ALCOHOL BEFORE APPLYING CLAMP. DO NOT APPLY EXCESSIVE FORCE TO ADHERE CLAMP TO FLOPPY DRIVE. DO NOT APPLY CLAMP TO FLOPPY DRIVE MOVING PARTS.
4 IF FLOPPY DRIVE IS NOT PRESENT (-05) ADHERE THE CABLE CLAMP (ITEM 22) TO CHASSIS UNDERSIDE.
ZIP DRIVE (OBSOLETE)
22
2
4
FLOPPY DRIVE
J329
J332
PC CARD DRIVE
22
3
4
FLOPPY DRIVE
J329
J332
15
13
C
J332
16
17
(4 PLCS)
17
19
(4 PLCS)
14
PC CARD DRIVE ASSEMBLY
(-03 & -05 ONLY)

Figure 11–30. ZB100980: Chassis assembly (sheet 1 of 3)

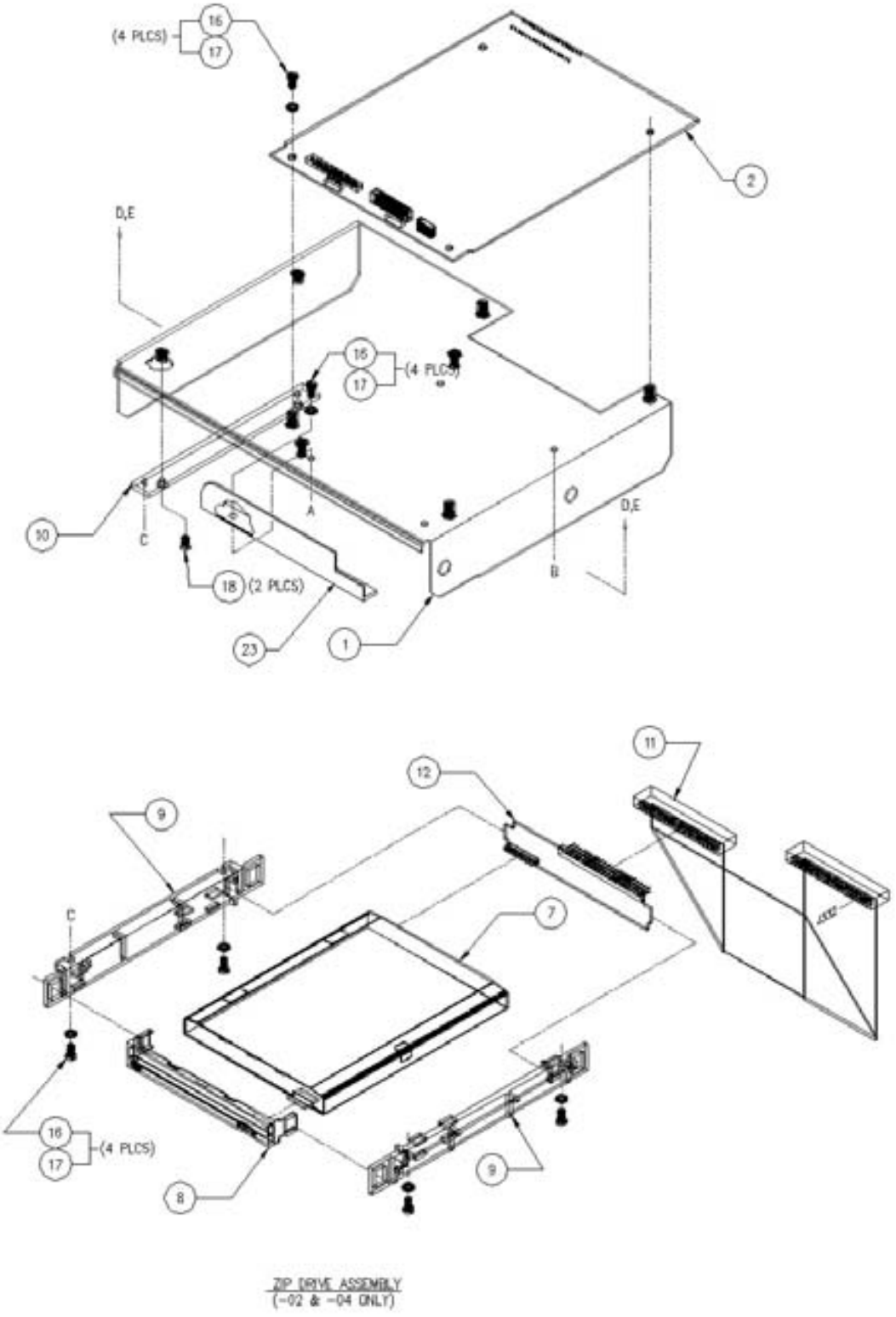

Figure 11–31. ZB100980: Chassis assembly (sheet 2 of 3)

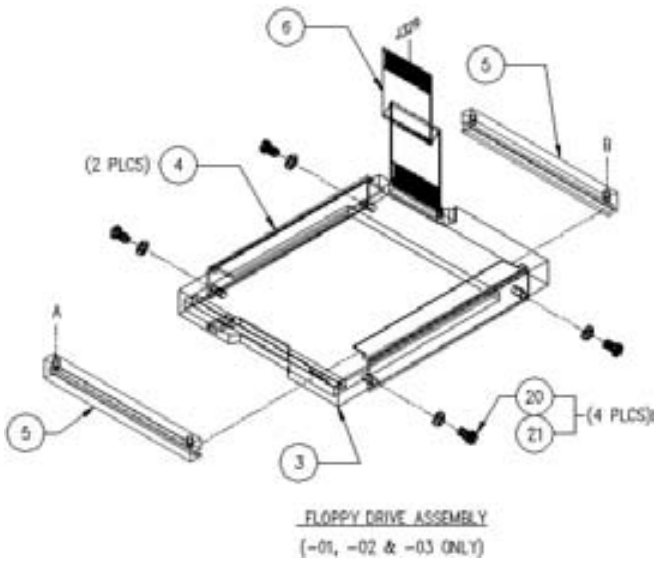

Figure 11–32. ZB100980: Chassis assembly (sheet 3 of 3)

Item No	Component No. Description	Quant	Uom
0001	ZB100974-01 CHASSIS FRAME ASSY	1.000	EA
0002	CB100502-02 PCB - CPU SV180/280	1.000	EA
0003	PA100211-01 FLOPPY DRIVE	1.000	EA
0004	MP102603-01 BRKT - MTG., FLOPPY DRIVE	2.000	EA
0005	MP102602-01 TRAP - FLOPPY DRIVE ASSY	2.000	EA
0006	HN101199-01 HARNESS - FLOPPY DRIVE	1.000	EA
0016	HW011404-04 SCREW-#4-40 X 1/4,BH	8.000	EA
0017	HW015004-04 WASHER-#4,INT LOCK	8.000	EA
0020	FA100088-01 SCREW-M2.5X4MM,PH(JIS B1111)	4.000	EA
0021	FA100096-02 2.5MM SPLIT LOCKWASHER	4.000	EA
0023	MP102621-01 BRKT - CHASSIS HANDLE	1.000	EA

Figure 11–33. ZB100980-01: Chassis assembly parts list, floppy drive only (sheet 1 of 1)

Item No	Component No. Description	Quant	Uom
0001	ZB100974-01 CHASSIS FRAME ASSY	1.000	EA
0002	CB100502-02 PCB - CPU SV180/280	1.000	EA
0003	PA100211-01 FLOPPY DRIVE	1.000	EA
0004	MP102603-01 BRKT - MTG., FLOPPY DRIVE	2.000	EA
0005	MP102602-01 TRAP - FLOPPY DRIVE ASSY	2.000	EA
0006	HN101199-01 HARNESS - FLOPPY DRIVE	1.000	EA
0007	ZB100958-01 ZIP DRIVE ASSY-OBSOLETE	1.000	EA
0008	MP102529-01 BEZEL - ZIP 100	1.000	EA
0009	MP102530-01 SUPPORT- ZIP 100 IS B1111)	2.000	EA
0010	MP102601-01 SPACER - ZIP SUPPORT	1.000	EA
0011	HN101200-01 HARNESS - ZIP I/F LE	1.000	EA
0012	CB100495-01 PCB ASSY.-ZIP DR. INTERFACE BD	1.000	EA
0016	HW011404-04 SCREW-#4-40 X 1/4,BH	12.000	EA
0017	HW015004-04 WASHER-#4,INT LOCK	12.000	EA
0018	HW011204-04 SCREW-#4-40 X 1/4,FH 100	2.000	EA
0020	FA100088-01 SCREW-M2.5X4MM,PH(JIS B1111)	4.000	EA
0021	FA100096-02 2.5MM SPLIT LOCKWASHER	4.000	EA
0022	CL100002-01 CLAMP CABLE 1"X1" 08406	2.000	EA
0023	MP102621-01 BRKT - CHASSIS HANDLE	1.000	EA

Figure 11–34. ZB100980-02: Chassis assembly parts list, floppy and zip drives (sheet 1 of 1) (for reference only)

Item No	Component No. Description	Quant	Uom
0001	ZB100974-01 CHASSIS FRAME ASSY	1.000	EA
0002	CB100502-02 PCB - CPU SV180/280	1.000	EA
0003	PA100211-01 FLOPPY DRIVE FD-05HF-5630 FD-05HF-8630 FD-05HF-8830	1.000	EA
0004	MP102603-01 BRKT - MTG., FLOPPY DRIVE	2.000	EA
0005	MP102602-01 TRAP - FLOPPY DRIVE ASSY	2.000	EA
0006	HN101199-01 HARNESS - FLOPPY DRIVE	1.000	EA
0010	MP102601-01 SPACER - ZIP SUPPORT	1.000	EA
0013	ZB100986-01 MOUNTING BRACKET - PCMCIA	1.000	EA
0014	CB100491-01 PCB ASSY- PCMCIA	1.000	EA
0015	HN101201-01 HARNESS - PCMCIA I/F	1.000	EA
0016	HW011404-04 SCREW-#4-40 X 1/4,BH	12.000	EA
0017	HW015004-04 WASHER-#4,INT LOCK	16.000	EA
0018	HW011204-04 SCREW-#4-40 X 1/4,FH 100	2.000	EA
0019	HW011404-03 SCREW,#4-40 X 3/16,BH, SLOTTED, S.S.	4.000	EA
0020	FA100088-01 SCREW-M2.5X4MM,PH(JIS B1111)	4.000	EA
0021	FA100096-02 2.5MM SPLIT LOCKWASHER	4.000	EA
0022	CL100002-01 CLAMP CABLE 1"X1" 08406	1.000	EA
0023	MP102621-01 BRKT - CHASSIS HANDLE	1.000	EA

Figure 11–35. ZB100980-03: Chassis assembly parts list, floppy and PC card drives (sheet 1 of 1)

Part number: **CB100503-01** **PCB ASSY - REAR TERM. PANEL**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100503-01	PCB - REAR TERMINAL PANEL	1.	EA
002	CA104709-01	CAP,0.1UF, X7R, 10%,CC1206,SMT	10.	EA
003	CA104709-03	CAP,470PF, X7R, 10%,CC1206,SMT	12.	EA
004	CA104709-04	CAP,220 PF,X7R,10%,CC1206,SMT	17.	EA
005	CA104709-06	CAP,47PF,X7R,10%,CC1206,SMT	8.	EA
006	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	246.	EA
007	CO100121-01	CONN-EDGE,0.156 C-C, 6/12 POS	2.	EA
008	CO100121-14	CONN-EDGE,0.156 C-C, 36/72 POS	5.	EA
009	CO100161-01	CONN-HDR W/GUID,.1C-C,2X5 POS	2.	EA
010	CO100161-13	CONN-HDR W/GUID,.1C-C,2X17 POS	1.	EA
011	CO100195-01	CONN - D-SUB, 9 POSITION	1.	EA
012	CO100195-03	CONN - D-SUB, 25 POSITION	1.	EA
013	CO100240-01	CONN - D-SUB,15 PIN, SHELL 1	1.	EA
014	CO100189-01	CONN - RJ45	1.	EA
015	CO100241-03	CONN - HEADER, 0.156 C-C	1.	EA
016	LB100613-01	LABEL-RTP	1.	EA
017	RS214990-DF	RES-499, 1/8W, 1%, CC1206, SMT	1.	EA
018	SE100465-S1	IC-DS1620, DIGITAL THERM, SMT	10.	EA
019	SE100507-S3	RELAY-SOLID ST, 1 FORM B, SMT	1.	EA
020	SE300053-17	VARISTOR-390V, SMT	1.	EA
021	TS100058-25	TERM BLOCK - 0.325CC, 25 POS	6.	EA
022	TS100059-25	TERM BLOCK-0.325CC,25 POS,TRI	4.	EA
023	FA100124-01	SCREWLOCK - D-SUB CONN., KIT	3.	EA
024	TL100244-01	TOOL-LABEL ALIGN	0.	EA

Figure 11–36. CB100503: Standard RTP PCB assembly parts list (sheet 1 of 1)

Item	Part Number	Description	Qty/Per	UOM
1	MC100538-01	PCB - REAR TERMINAL PANEL MX60/MM120 CONNECTION	1	EA
2	CA104709-01	CAP,0.1UF, X7R, 10%,CC1206,SMT	8	EA
3	CA104709-03	CAP,470PF, X7R, 10%,CC1206,SMT	8	EA
4	CA104709-04	CAP,220 PF,X7R,10%,CC1206,SMT	17	EA
5	CA104709-06	CAP,47PF,COG,10%,CC1206,SMT	8	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
6	CA104716-01	CAP-0.01UF,500V,10%,CC1808,SMT	206	EA
7	CO100121-01	CONN-EDGE,0.156 C-C, 6/12 POS	2	EA
8	CO100121-14	CONN-EDGE,0.156 C-C, 36/72 POS	4	EA
9	CO100161-01	CONN-HDR W/GUID,.1C-C,2X5 POS	2	EA
10	CO100161-13	CONN-HDR W/GUID,.1C-C,2X17 POS	1	EA
11	CO100195-01	CONN - D-SUB, 9 POSITION	1	EA
12	CO100195-03	14-A - D-SUB, 25 POSITION	3	EA
13	CO100240-01	CONN - D-SUB,15 PIN, SHELL 1	1	EA
14	CO100189-01	CONN - RJ45	1	EA
15	CO100241-03	CONN - HEADER, 0.156 C-C	1	EA
17	RS214990-DF	RES-499, 1/8W, 1%, CC1206, SMT	1	EA
18	SE100465-S1	IC-DS1620, DIGITAL THERM, SMT	8	EA
19	SE100507-S3	RELAY-SOLID ST, 1 FORM B, SMT	1	EA
20	SE300053-17	VARISTOR-390V, SMT	1	EA
21	TS100058-25	TERM BLOCK - 0.325CC, 25 POS	4	EA
22	TS100059-25	TERM BLOCK-0.325CC,25 POS,TRI	4	EA
23	FA100124-01	SCREWLOCK - D-SUB CONN., KIT	3	EA
24	CA104744-01	CAP, 33PF 5%, 50V, COG 1206	4	EA
26	CO100121-03	CONN-EDGE, .156 C-C, 10/20 POS	1	EA
27	TS100025-15	TERM STRIP-0.325 C-C, 15 POS	2	EA
28	CO100042-01	CONN,DB51221-1,RETAINER	2	EA

Figure 11–37. CB100538: Multibank RTP PCB assembly parts list (sheet 1 of 1)

Part number: **CB100504-01** **PCB ASSY - POWER INPUT**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100504-01	PCB - POWER INPUT	1.	EA
002	TS100005-20	TERM-SSB6FG030202NNNN	1.	EA
003	CO100242-01	CONTACT - IEC60320	3.	EA
004	LB100614-01	LABEL - POWER INPUT	1.	EA

Figure 11–38. CB100504: Power input PCB assembly parts list (sheet 1 of 1)

Part number: **CB100505-01** **PCB ASSY-POWER SUPPLY CARRIER**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100505-01	PCB - POWER SUPPLY CARRIER	1.	EA
002	PA100225-01	POWER SUPPLY	1.	EA
004	FU100023-01	FUSE HOLDER-SUBMIN, RADIAL	1.	EA
005	FU100022-31	FUSE-SUBMIN,PLUG-IN,RAD,3.15A	1.	EA
007	FA100000-03	STANDOFF-PCB,4-40X.250,SELF-CL	4.	EA
008	LB100639-01	COVER - PROTECTIVE	2.	EA
009	LB100631-01	COVER - PROTECTIVE	1.	EA
010	ZB100981-01	BRACKET ASSY - P/S	1.	EA
011	RM100217-02	CARD GUIDE-0.062 PCB	5.	EA
012	HW011404-03	SCREW-#4-40 X 3/16,BH	10.	EA
013	HW015004-04	WASHER-#4,INT LOCK	10.	EA

Part number: **CB100505-02** **PCB ASSY-P/S CARRIER**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100505-01	PCB - POWER SUPPLY CARRIER	1.	EA
002	PA100225-01	POWER SUPPLY	1.	EA
003	PA100225-03	POWER SUPPLY	1.	EA
004	FU100023-01	FUSE HOLDER-SUBMIN, RADIAL	2.	EA
005	FU100022-31	FUSE-SUBMIN,PLUG-IN,RAD,3.15A	1.	EA
006	FU100022-25	FUSE-SUBMIN,PLUG-IN,RAD,2.50A	1.	EA
007	FA100000-03	STANDOFF-PCB,4-40X.250,SELF-CL	8.	EA
008	LB100639-01	COVER - PROTECTIVE	2.	EA
009	LB100631-01	COVER - PROTECTIVE	1.	EA
010	ZB100981-01	BRACKET ASSY - P/S	1.	EA
011	RM100217-02	CARD GUIDE-0.062 PCB	5.	EA
012	HW011404-03	SCREW-#4-40 X 3/16,BH	18.	EA
013	HW015004-04	WASHER-#4,INT LOCK	18.	EA
015	RM100039-13	JUMPER WIRE-0.700 LG, 22 AWG	2.	EA
017	RM100039-14	JUMPER WIRE-0.900 LG, 22 AWG	3.	EA
020	RS412431-DF	RES-SMT,2010,100PPM,1%,2.43K	2.	EA

Part number: **CB100505-03** **PCB ASSY-P/S CARRIER,EMI**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100505-01	PCB - POWER SUPPLY CARRIER	1.	EA
002	PA100225-01	POWER SUPPLY	1.	EA
004	FU100023-01	FUSE HOLDER-SUBMIN, RADIAL	1.	EA
005	FU100022-31	FUSE-SUBMIN,PLUG-IN,RAD,3.15A	1.	EA
007	FA100000-03	STANDOFF-PCB,4-40X.250,SELF-CL	4.	EA
008	LB100639-01	COVER - PROTECTIVE	2.	EA
009	LB100631-01	COVER - PROTECTIVE	1.	EA
010	ZB100981-01	BRACKET ASSY - P/S	1.	EA
011	RM100217-02	CARD GUIDE-0.062 PCB	5.	EA
012	HW011404-03	SCREW-#4-40 X 3/16,BH	10.	EA
013	HW015004-04	WASHER-#4,INT LOCK	10.	EA
014	FL100004-03	FILTER-POWER LINE, 3A	1.	EA
016	CK100012-56	CHOKE - 56UH,0.8A,RF,AXIAL	3.	EA
018	SE300026-25	VARISTOR-14MM, 0.6W, RAD, 430V	3.	EA
019	SE300069-S1	TVS - 1500W,85V,BI-DIR.,SMD	9.	EA

Figure 11–39. CB100505: Power supply carrier PCB assembly parts list (sheet 1 of 2)

Part number: **CB100505-04** **PCB**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100505-01	PCB - POWER SUPPLY CARRIER	1.	EA
002	PA100225-01	POWER SUPPLY	1.	EA
003	PA100225-03	POWER SUPPLY	1.	EA
004	FU100023-01	FUSE HOLDER-SUBMIN, RADIAL	2.	EA
005	FU100022-31	FUSE-SUBMIN,PLUG-IN,RAD,3.15A	1.	EA
006	FU100022-25	FUSE-SUBMIN,PLUG-IN,RAD,2.50A	1.	EA
007	FA100000-03	STANDOFF-PCB,4-40X.250,SELF-CL	4.	EA
008	LB100639-01	COVER - PROTECTIVE	2.	EA
009	LB100631-01	COVER - PROTECTIVE	1.	EA
010	ZB100981-01	BRACKET ASSY - P/S	1.	EA
011	RM100217-02	CARD GUIDE-0.062 PCB	5.	EA
012	HW011404-06	SCREW-#4-40 X 3/8,BH	18.	EA
013	HW015004-04	WASHER-#4,INT LOCK	18.	EA
014	FL100004-03	FILTER-POWER LINE, 3A	1.	EA
016	CK100012-56	CHOKE - 56UH,0.8A,RF,AXIAL	3.	EA
018	SE300026-25	VARISTOR-14MM, 0.6W, RAD, 430V	3.	EA
019	SE300069-S1	TVS - 1500W,85V,BI-DIR.,SMD	9.	EA
020	RS412431-DF	RES-SMT,2010,100PPM,1%,2.43K	2.	EA

Figure 11–40. CB100505: Power supply carrier PCB assembly parts list (sheet 2 of 2)

Part number: **CB100506-01** **PCB ASSY - ADC**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100506-01	PCB - ADC BOARD	1.	EA
002	CA100300-15	CAP,0.0047MF,CER DISC	1.	EA
003	CA104100-04	CAP, CK06, 0.022MF, 100V	2.	EA
004	CA060310-75	CAP-0.1UF/50V, CERAMIC	28.	EA
005	CA102800-06	CAP-10UF 16V SOLID TANTALUM	9.	EA
006	TS100013-05	CONN-HEADER, 0.1 C-C, 2X5 POS	1.	EA
007	SE1N4148-00	DIODE-1N4148	3.	EA
008	LM100007-02	LED-GREEN, WITH RESISTOR	1.	EA
009	SE100278-01	IC-74HC04, HEX INVERTER	1.	EA
010	SE100279-01	IC-74HC08, QUAD 2-INP AND, DIP	1.	EA
011	SE100283-01	IC,74HC138, 3-8 LINE DEC, DIP	6.	EA
012	SE100493-01	IC-74HC165 8-BIT SHIFT REG	2.	EA
013	SE100388-01	IC-74HC393,DUAL,4 BIT B.C.	3.	EA
014	SE100315-01	IC,75176,AP	1.	EA
015	SE100403-01	IC,AD586,5V REF	1.	EA
016	SE100399-01	IC,AD652,VFC	1.	EA
017	SE100506-02	IC-AT90S8515 MICROCONTROLLER	1.	EA
018	SE100460-01	IC-HCPL2631,DUAL OPTO COUP,DIP	2.	EA
019	SE100033-01	IC-QUAD SPST CMOS ANALOG SW	2.	EA
020	SE100478-01	IC-ILD1 DUAL OPTO COUPLER	1.	EA
021	SE100511-01	IC-DC/DC CONV,1W,SIP,5TO5	1.	EA
022	SE100512-01	IC-DC/DC CONV,1W,SIP,5TO+/-15	1.	EA
023	SE100305-01	IC,OP77,OP AMP	1.	EA
024	SE100528-02	IC-OSCILLATOR, 7.3728 MHZ	1.	EA
025	CK100002-27	CHOKE-MOLDED RF, 15UH	2.	EA
026	RZ100025-01	RESISTOR-0 OHM JMPR, MF, AXIAL	1.	EA
027	RN5536R5-DF	RES,36.5, 1/4W, 1%, MF	1.	EA
028	RN5537R4-DF	RES-37.4, 1/4W, 1%, MF	1.	EA
029	RN5549R9-DF	RES-49.9, 1/4W, 1%, MF	1.	EA
030	RN5576R8-DF	RES-76.8, 1/4W, 1%, MF	1.	EA
031	RN551000-DF	RES-100, 1/4W, 1%, MF	2.	EA
032	RN552430-DF	RES-243, 1/4W, 1%, MF	1.	EA
033	RN554220-DF	RES-422, 1/4W, 1% MF, 100PPM	1.	EA
034	RN554990-DF	RES-499, 1/4W, 1%, MF	5.	EA
035	RN556040-DF	RES-604, 1/4W, 1%, MF	1.	EA
036	RN558060-DF	RES-806, 1/4W, 1%, MF	1.	EA
037	RN551001-DF	RES-1K, 1/4W, 1%, MF	4.	EA
038	RN553011-DF	RES-3.01K, 1/4W, 1%, MF	1.	EA
039	RN553321-DF	RES-3.32K, 1/4W, 1%, MF	1.	EA
040	RN553831-DF	RES-3.83K, 1/4W, 1%, MF	1.	EA
041	RN554421-DF	RES-4.42, 1/4W, 1%, MF	1.	EA
042	RN555111-DF	RES-5.11K, 1/4W, 1%, MF	3.	EA
043	RN555231-DF	RES-5.23K, 1/4W, 1%, MF	2.	EA
044	RN551002-DF	RES-10K, 1/4W, 1%, MF	7.	EA
045	RN552002-DF	RES-20K, 1/4W, 1%, MF	3.	EA
046	RN552322-DF	RES-23.2K, 1/4W, 1%, MF	1.	EA
047	SE100447-S2	RELAY-SOLID ST,DUAL 1 FM A,SMT	18.	EA
048	SO100001-13	SOCKET-LO PRO,.1X.6,40 POS DIP	1.	EA
049	SEMPSA14-00	TRANSISTOR-MPSA14	1.	EA
050	TS000102-05	TERM-TEST POINT	3.	EA
051	RM061710-00	CARD EJECTOR-W/ROLL PIN	1.	EA

Figure 11–41. CB100506-01: Standard ADC PCB assembly parts list (sheet 1 of12)

Part number: **CB100506-02** **PCB ASSY - ADC W/ RTD**

Itm	Part Number	Description	Qty/Per	UOM
001	CB100506-01	PCB ASSY - ADC	1.	EA
002	CA060310-75	CAP-0.1UF/50V, CERAMIC	6.	EA
003	CA102800-06	CAP-10UF 16V SOLID TANTALUM	1.	EA
004	SE100260-02	IC-REF01E,10V VOLTAGE REF, DIP	1.	EA
005	SE100309-02	IC-LT1013AC, DUAL OP AMP, DIP	1.	EA
006	SE100512-01	IC-DC/DC CONV,1W,SIP,5TO+/-15	1.	EA
007	RN5540R2-DF	RES-40.2, 1/4W, 1% MF, 100PPM	1.	EA
008	RN5549R9-DF	RES-49.9, 1/4W, 1%, MF	3.	EA
009	RN552430-DF	RES-243, 1/4W, 1%, MF	2.	EA
010	RN554991-DF	RES-4.99K, 1/4W, 1%, MF	1.	EA
011	RN552002-DF	RES-20K, 1/4W, 1%, MF	1.	EA
012	RZ000501-79	RES-400, 0.3W, 0.01%, MF	1.	EA
013	RZ000501-27	RES-1K, 0.3W, 0.05%, MF	2.	EA
014	SE100447-S1	RELAY-SOLID ST, 1 FORM A, SMT	16.	EA
015	SE100447-S2	RELAY-SOLID ST,DUAL 1 FM A,SMT	18.	EA
016	SE200032-01	TRANS-A64 TYPE, DARL, PNP	2.	EA

Figure 11–42. CB100506-02: ADC with RTD PCB assembly parts list (sheet 1 of 1)

Item	Part Number	Description	Qty/Per	UOM
1	MC100537-01	PCB - SV180/280 - MX60/MM120 INTERFACE	1	EA
2	CA100300-15	CAP,0.0047MF,CER DISC	1	EA
3	CA104100-04	CAP, CK06, 0.022MF, 100V	2	EA
4	CA060310-75	CAP-0.1UF/50V, CERAMIC	32	EA
4	CA060310-75	CAP-0.1UF/50V, CERAMIC	32	EA
4	CA060310-75	CAP-0.1UF/50V, CERAMIC	32	EA
4	CA060310-75	CAP-0.1UF/50V, CERAMIC	32	EA
5	CA102800-06	CAP-10UF 16V SOLID TANTALUM	11	EA
5	CA102800-06	CAP-10UF 16V SOLID TANTALUM	11	EA
6	TS100013-05	CONN-HEADER, 0.1 C-C, 2X5 POS	1	EA
7	SE1N4148-00	DIODE-1N4148	3	EA
8	LM100007-02	LED-GREEN, WITH RESISTOR, 5V	1	EA
9	SE100278-01	IC-74HC04, HEX INVERTER	1	EA
10	SE100279-01	IC-74HC08, QUAD 2-INP AND, DIP	1	EA
11	SE100283-01	IC,74HC138, 3-8 LINE DEC, DIP	1	EA
12	SE100493-01	IC-74HC165 8-BIT SHIFT REG	2	EA
13	SE100388-01	IC-74HC393,DUAL,4 BIT B.C.	3	EA
14	SE100315-01	IC,75176,AP	1	EA
15	SE100403-01	IC,AD586,5V REF	1	EA
16	SE100399-01	IC,AD652,VFC	1	EA
17	SE100506-02	IC-AT90S8515 MICROCONTROLLER	1	EA
18	SE100460-01	IC, DUAL OPTO COUP, 8-PIN-DIP	3	EA
19	SE100033-01	IC-QUAD SPST CMOS ANALOG SW	2	EA
20	SE100478-01	IC-ILD1 DUAL OPTO COUPLER	1	EA
21	SE100511-01	IC-DC/DC CONV,1W,SIP,5TO5	1	EA
22	SE100512-01	IC-DC/DC CONV,1W,SIP,5TO+/-15	2	EA
23	SE100305-01	IC,OP77,OP AMP	1	EA
24	SE100528-02	IC-OSCILLATOR, 7.3728 MHZ	1	EA
25	CK100002-27	CHOKE-MOLDED RF, 15UH	2	EA
26	RZ100025-01	RESISTOR-0 OHM JMPR, MF, AXIAL	1	EA
27	RN5536R5-DF	RES,36.5, 1/4W, 1%, MF	1	EA
28	RN5537R4-DF	RES-37.4, 1/4W, 1%, MF	1	EA
29	RN5549R9-DF	RES-49.9, 1/4W, 1%, MF	4	EA
30	RN5576R8-DF	RES-76.8, 1/4W, 1%, MF	1	EA
31	RN551000-DF	RES-100, 1/4W, 1%, MF	2	EA
32	RN552430-DF	RES-243, 1/4W, 1%, MF	3	EA
33	RN554220-DF	RES-422, 1/4W, 1% MF, 100PPM	1	EA
34	RN554990-DF	RES-499, 1/4W, 1%, MF	7	EA
34	RN554990-DF	RES-499, 1/4W, 1%, MF	7	EA
35	RN556040-DF	RES-604, 1/4W, 1%, MF	1	EA
36	RN558060-DF	RES-806, 1/4W, 1%, MF	1	EA
37	RN551001-DF	RES-1K, 1/4W, 1%, MF	6	EA
38	RN553011-DF	RES-3.01K, 1/4W, 1%, MF	1	EA
39	RN553321-DF	RES-3.32K, 1/4W, 1%, MF	1	EA
40	RN553831-DF	RES-3.83K, 1/4W, 1%, MF	1	EA
41	RN554421-DF	RES-4.42, 1/4W, 1%, MF	1	EA
42	RN555111-DF	RES-5.11K, 1/4W, 1%, MF	3	EA
43	RN555231-DF	RES-5.23K, 1/4W, 1%, MF	2	EA
44	RN551002-DF	RES-10K, 1/4W, 1%, MF	10	EA
44	RN551002-DF	RES-10K, 1/4W, 1%, MF	10	EA
45	RN552002-DF	RES-20K, 1/4W, 1%, MF	4	EA

Figure 11–43. CB100537: Multibank ADC PCB assembly parts list (sheet 1 of 2)

Item	Part Number	Description	Qty/Per	UOM
46	RN552322-DF	RES-23.2K, 1/4W, 1%, MF	1	EA
47	SE100447-S2	RELAY-SOLID ST,DUAL 1 FM A,SMT	6	EA
48	SO100001-13	SOCKET-LO PRO,.1X.6,40 POS DIP	1	EA
49	SEMPSA14-00	TRANSISTOR-MPSA14	1	EA
50	TS000102-05	TERM-TEST POINT	3	EA
52	SE100260-02	IC-REF01E,10V VOLTAGE REF, DIP	1	EA
53	SE100309-02	IC-LT1013AC, DUAL OP AMP, DIP	1	EA
55	RN5540R2-DF	RES-40.2, 1/4W, 1% MF, 100PPM	1	EA
58	RN554991-DF	RES-4.99K, 1/4W, 1%, MF	1	EA
60	RZ000501-79	RES-400, 0.3W, 0.01%, MF	1	EA
61	RZ000501-27	RES-1K, 0.3W, 0.05%, MF	2	EA
62	SE100447-S1	RELAY-SOLID ST, 1 FORM A, SMT	1	EA
63	SE200032-01	TRANS-A64 TYPE, DARL, PNP	2	EA
64	RN601000-DF	RES,100,1/2W,1%,MF	2	EA
65	RN602000-DF	RES,200,1/2W,1%,MF	2	EA
66	RN554642-DF	RES-4.64K, 1/4W, 1%, MF	2	EA
67	RN603012-DF	RES,30.1K,1/2W,1%,MF	1	EA
68	SE1N5232-B0	DIODE,1N5232B	2	EA
71	SE100554-01	IC-DC/DC CONV. 3W,5VIN,24/48/72VOUT	1	EA
72	SE100556-01	IC-5V REGULATOR LM2936-5.0	1	EA
73	SE100555-01	IC-DC/DC CONV. 2W,5VIN,+/-15 VOUT	1	EA
74	SE200556-01	XSTR - PNP GENERAL PURPOSE	4	EA

Figure 11–44. CB100537: Multibank ADC PCB assembly parts list (sheet 2 of 2)

Part number: **CB100507-01** **PCB ASSY - GPIO**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100507-01	PCB - GPIO BOARD	1.	EA
002	CA060310-75	CAP-0.1UF/50V, CERAMIC	12.	EA
003	CA060619-48	CAP-1.0UF,35V, TANTALUM	2.	EA
004	CA102800-06	CAP-10UF 16V SOLID TANTALUM	2.	EA
005	TS100013-05	CONN-HEADER, 0.1 C-C, 2X5 POS	1.	EA
006	CO100097-03	CONN-HEADER, 0.1 C-C, 3 POS	16.	EA
007	CO100061-01	CONN-HEADER STRIP JUMPER	16.	EA
008	SE1N4148-00	DIODE-1N4148	1.	EA
009	LM100007-02	LED-GREEN, WITH RESISTOR	1.	EA
010	SE100278-01	IC-74HC04, HEX INVERTER	1.	EA
011	SE100279-01	IC-74HC08, QUAD 2-INP AND, DIP	1.	EA
012	SE100285-01	IC-74HC244, OCTAL 3-ST BUFFER	2.	EA
013	SE100374-01	IC-74HC273,OCTAL,D TYPE,FF	2.	EA
014	SE100506-02	IC-AT90S8515 MICROCONTROLLER	1.	EA
015	SE100363-01	IC-ILQ-30, OPTICAL ISOLATOR	7.	EA
016	SE100362-04	IC,8 CH. DARLINGTON DRVR	2.	EA
017	SE100315-01	IC,75176,AP	1.	EA
018	SE100513-01	IC-DC/DC CONV,3W,SIP,12VIN	2.	EA
019	SE100528-02	IC-OSCILLATOR, 7.3728 MHZ	1.	EA
020	CK100002-27	CHOKE-MOLDED RF, 15UH	4.	EA
021	RL100005-05	RELAY-MINI 250VDC CONTACTS,24V	16.	EA
022	RN558060-DF	RES-806, 1/4W, 1%, MF	1.	EA
023	RN551001-DF	RES-1K, 1/4W, 1%, MF	1.	EA
024	RN554991-DF	RES-4.99K, 1/4W, 1%, MF	12.	EA
025	RN551002-DF	RES-10K, 1/4W, 1%, MF	3.	EA
026	RZ100002-24	RES,NET,110A681	2.	EA
027	RZ100002-09	RES NET-10K X 9, 10 PIN SIP	2.	EA
028	SE300068-39	VARISTOR,7MM,0.25W,RADIAL,390V	16.	EA
029	SO100001-13	SOCKET-LO PRO,.1X.6,40 POS DIP	1.	EA
030	RM061710-00	CARD EJECTOR-W/ROLL PIN	1.	EA

Figure 11–45. CB100507: GPIO assembly parts list (sheet 1 of 1)

Part number: **CB100515-01** **PCB ASSY-P/S,125VDC,EMI**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100515-01	PCB-DC POWER SUPPLY CARRIER	1.	EA
002	PA100243-03	PWR.SUPPLY,125VDC TO 5VDC, 25W	1.	EA
003	PA100243-04	PWR.SUPPLY,125VDC TO 12VDC,25W	1.	EA
006	CA104735-02	CAP-TANT.,AXIAL, 100UF, 20V	2.	EA
007	CA104735-01	CAP-TANT.,AXIAL, 220UF, 10V	2.	EA
008	FU100023-01	FUSE HOLDER-SUBMIN, RADIAL	2.	EA
009	FU100022-16	FUSE-SUBMIN,PLUG-IN,RAD,1.6A	2.	EA
011	CK100012-56	CHOKE - 56UH,0.8A,RF,AXIAL	3.	EA
012	CK100013-01	INDUCTOR-POWDER CORE-110NH	2.	EA
013	SE300026-25	VARISTOR-14MM, 0.6W, RAD, 430V	3.	EA
014	SE300069-S1	TVS - 1500W,85V,BI-DIR.,SMD	9.	EA
015	LB100631-01	COVER - PROTECTIVE	4.	EA
016	ZB100981-01	BRACKET ASSY - P/S	1.	EA
017	RM100217-02	CARD GUIDE-0.062 PCB	5.	EA
018	HW011404-03	SCREW-#4-40 X 3/16,BH	2.	EA
019	HW015004-04	WASHER-#4,INT LOCK	2.	EA

Part number: **CB100515-02** **PCB ASSY-P/S,125VDC,EMI,24V**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100515-01	PCB-DC POWER SUPPLY CARRIER	1.	EA
002	PA100243-03	PWR.SUPPLY,125VDC TO 5VDC, 25W	1.	EA
003	PA100243-04	PWR.SUPPLY,125VDC TO 12VDC,25W	1.	EA
004	PA100243-06	PWR.SUPPLY,125VDC TO 24VDC,25W	1.	EA
005	CA104735-03	CAP-TANT.,AXIAL, 47UF, 35V	3.	EA
006	CA104735-02	CAP-TANT.,AXIAL, 100UF, 20V	2.	EA
007	CA104735-01	CAP-TANT.,AXIAL, 220UF, 10V	2.	EA
008	FU100023-01	FUSE HOLDER-SUBMIN, RADIAL	4.	EA
009	FU100022-16	FUSE-SUBMIN,PLUG-IN,RAD,1.6A	3.	EA
010	FU100022-25	FUSE-SUBMIN,PLUG-IN,RAD,2.50A	1.	EA
011	CK100012-56	CHOKE - 56UH,0.8A,RF,AXIAL	3.	EA
012	CK100013-01	INDUCTOR-POWDER CORE-110NH	3.	EA
013	SE300026-25	VARISTOR-14MM, 0.6W, RAD, 430V	3.	EA
014	SE300069-S1	TVS - 1500W,85V,BI-DIR.,SMD	9.	EA
015	LB100631-01	COVER - PROTECTIVE	4.	EA
016	ZB100981-01	BRACKET ASSY - P/S	1.	EA
017	RM100217-02	CARD GUIDE-0.062 PCB	5.	EA
018	HW011404-03	SCREW-#4-40 X 3/16,BH	2.	EA
019	HW015004-04	WASHER-#4,INT LOCK	2.	EA

Part number: **CB100515-03** **PCB ASSY-P/S,24VDC,EMI**

Itm	Part Number	Description	Qty/Per	UOM
001	MC100515-01	PCB-DC POWER SUPPLY CARRIER	1.	EA
002	PA100243-01	PWR.SUPPLY,24VDC TO 5 VDC, 25W	1.	EA
003	PA100243-02	PWR.SUPPLY,24VDC TO 12VDC, 25W	1.	EA
006	CA104735-02	CAP-TANT.,AXIAL, 100UF, 20V	2.	EA
007	CA104735-01	CAP-TANT.,AXIAL, 220UF, 10V	2.	EA
008	FU100023-01	FUSE HOLDER-SUBMIN, RADIAL	2.	EA
009	FU100022-16	FUSE-SUBMIN,PLUG-IN,RAD,1.6A	2.	EA
011	CK100012-56	CHOKE - 56UH,0.8A,RF,AXIAL	3.	EA
012	CK100013-01	INDUCTOR-POWDER CORE-110NH	2.	EA
013	SE300026-25	VARISTOR-14MM, 0.6W, RAD, 430V	3.	EA
014	SE300069-S1	TVS - 1500W,85V,BI-DIR.,SMD	9.	EA
015	LB100631-01	COVER - PROTECTIVE	4.	EA
016	ZB100981-01	BRACKET ASSY - P/S	1.	EA
017	RM100217-02	CARD GUIDE-0.062 PCB	5.	EA
018	HW011404-03	SCREW-#4-40 X 3/16,BH	2.	EA

Figure 11–46. CB100515: DC power supply carrier PCB assembly parts list (sheet 1 of 1)

Appendix A
Return Authorization

All equipment and/or parts to be returned to Thermo Fisher for repair or credit must have a Return Material Authorization (RMA). This RMA is issued by the service department. When calling for a RMA, please provide your purchase order number and an explanation of why equipment and/or parts are being returned.

After obtaining the RMA, return equipment along with the RMA and a copy of the purchase order. This ensures rapid service and/or credit.

C.O.D. CHARGES ARE NOT ACCEPTED.

Required information for factory repairs:

Instrument model #: _____

Serial #: _____

Return approved by: _____

Customer. P.O. (required for all returned equipment): _____

Date: _____ Requested return date: _____

Warranty repair request: ____Yes _____ No

Return address: _____

_____

Attn (name): _____

Contact name: _____

Phone: _____

Describe equipment defect: _____

_____

_____

_____

Ship prepaid to: Thermo Fisher Scientific

1410 Gillingham Lane

Sugar Land, TX 77478 USA

Pack the instrument according to the steps below. The customer is liable for all damages caused by improper packing.

1. Pack unit in a new reinforced box or crate.

2. There should be at least two inches of resilient packing material (sheets or blocks) on all sides of unit.

3. Packing material should hold unit in center of shipping box and not allow unit to shift inside shipping box.

4. Ship unit with all shipping screws and other shipping retaining devices in place.

5. Shipping boxes are available from Thermo Fisher for a small charge. Please consult service department for pricing.

Appendix B
Recommended Spare Parts

Commercial Grade Recorders

The following spare parts are recommended for installations that require minimum downtime. Installations with 10 or more recorders should have at least 2 sets of recommended spare parts.

(*) Indicates spare parts that are recommended for normal service support.

Table B–1.

Item	Qty	P/N	Description	Notes
1	1*	ZB100984-01	Display/Touch screen assembly	A
2	1*	PA100211-01	Floppy drive assembly	A
			OR	
2	1	CB100491-01	PCMCIA assembly	A
			OR	
2	1*	ZB100958-01	Zip drive assembly	A
3	1*	CB100506-01	PCB assembly: ADC board; mV, V mA, TC	A, B
			OR	
3	1*	CB100506-02	PCB assembly: ADC board; mV, V, mA, TC, RTD	A, B
			OR	
3	1	CB100537	PCB assembly: ADC board for remote mux interface	A
4	1*	CB100507-01	PCB assembly: GPIO relay board	A
5	1*	CB100502-01	PCB assembly: CPU board	
			OR	
5	1*	CB100505-01	PCB assembly: Power supply	
			OR	
5	1*	CB100505-02	PCB assembly: Power supply with 24 Vdc power	A
7	1*	FU100022-31	Fuse: Subminiature, plug-in, radial, 3.15 A	
8	1*	FU100022-01	Fuse: Subminiature, plug-in, radial, 2.4 A (2-wire transmitter option)	A

NOTES: A – This part is recommended only when this option has been purchased.

B – This part may be used up to 5 times in each unit.

Controlled Program Recorders

The following spare parts are recommended for installations that require minimum downtime. Installations with 10 or more recorders should have at least 2 sets of recommended spare parts.

(*) Indicates spare parts that are recommended for normal service support.

Table B–2.

Item	Qty	P/N	Description	Notes
1	1	ZB100984C01	Display/Touch screen assembly	
2	1	PA100211C01	Floppy drive assembly	A
			OR	
2	1	CB100491C01	PCMCIA assembly	A
3	1*	CB100506C01	PCB assembly: ADC board; mV, V, mA, TC	A, B
			OR	
3	1*	CB100506C02	PCB assembly: ADC board; mV, V, mA, TC, RTD	A, B
4	1*	CB100507C01	PCB assembly: GPIO relay board	A
5	1*	CB100502C02	PCB assembly: CPU board	
5	1*	CB100505C01	PCB assembly: Power supply	
			OR	
5	1*	CB100505C02	PCB assembly: Power supply with 24 Vdc power	A
7	1*	FU100022C31	Fuse: Subminiature, plug-in, radial, 3.15 A	
8	1*	FU100022C01	Fuse: Subminiature, plug-in, radial, 2.5 A (2-wire transmitter option)	A

NOTES: A – This part is recommended only when this option has been purchased.

B – This part may be used up to 5 times in each unit.

Appendix C
Point Programming Forms

Use the forms on the following pages to record data as you connect inputs. Make copies as needed.

Unit Tag: Point #: Page of

Linear Type Point								
Type: ☐ 50 mV	☐ 100 mV	☐ 200 mV	☐ 1 V	☐ 5 V	☐ 10 V	☐ 4–20 mA	☐ 10–50 mA	
Display								
Point tag:				Eng. units:				
Low scale:		High scale:			Bands: ☐ Enabled	☐ Disabled		
Band	Low scale		High scale		Color			
1								
2								
3								
Major grid:		Submajor grid:			Minor grid:			
Decimal fix: ☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ E			
Normal color:				Alarm color:				
Input Source								
☐ Local	☐ MM120/MX60 Ports:		Box:	Card:	Relay:			
Input & Output								
	Low scale	High scale		Low scale	High scale			
Input (V):			Output:					
Filter:				Current: ☐ On	☐ Off			
Alarm Setup								
Alarm	Type					Set point	Contact	Rate (s)
1	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate			
2	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate			
3	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate			
4	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate			
5	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate			
Abnormal value:		Alarm delay:			Deadband:			

Unit Tag: Point #: Page of

Thermocouple Type Point										
Type: ☐ J	☐ K	☐ T	☐ E	☐ R	☐ S	☐ B	☐ C	☐ M	☐ N	

Display			
Point tag:			
Low scale:	High scale:	Bands: ☐ Enabled	☐ Disabled

Band	Low scale	High scale	Color
1			
2			
3			

Major grid:	Submajor grid:	Minor grid:
Decimal fix: ☐ 0 ☐ 1	Degrees: ☐ C ☐ F ☐ K	
Normal color:	Alarm color:	

Input Source					
☐ Local	☐ MM120/MX60	Ports:	Box:	Card:	Relay:
Filter:	Compensation: ☐ Local	☐ Remote	Point:		

Alarm Setup										
Alarm	Type						Set point	Contact	Rate (s)	
1	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate					
2	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate					
3	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate					
4	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate					
5	☐ None	☐ Abnormal	☐ High	☐ Low	☐ Rate					
Abnormal value:			Alarm delay:				Deadband:			

Unit Tag: Point #: Page of

RTD Type Point

Type: ☐ 10 cu ☐ 100 pt 385 ☐ 100 pt 392 ☐ 200 pt 385 ☐ 200 pt 392 ☐ 500 pt 385 ☐ 120 ni

Display

Point tag:

Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled

Band	Low scale	High scale	Color
1			
2			
3			

Major grid:	Submajor grid:	Minor grid:

Decimal fix: ☐ 0 ☐ 1	Degrees: ☐ C ☐ F ☐ K
Normal color:	Alarm color:

Input Source

☐ Local ☐ MM120/MX60 Ports: Box: Card: Relay:

Filter:

Alarm Setup

Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			

Abnormal value:	Alarm delay:	Deadband:

Unit Tag: Point #: Page of

Log Linear Type Point

Type: ☐ 50 mV ☐ 100 mV ☐ 200 mV ☐ 1 V ☐ 5 V ☐ 10 V ☐ 4–20 mA ☐ 10–50 mA

Display

Point tag:	Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled

Band	Low scale	High scale	Color
1			
2			
3			

Major grid: Not programmable	Submajor grid: Not programmable	Minor grid: Not programmable

Decimal fix: ☐ E

Normal color:	Alarm color:

Input Source

☐ Local	☐ MM120/MX60 Ports: Box: Card: Relay:

Input & Output

	Low scale	High scale		Low scale	High scale
Input (V):			Output:		

Filter:	Current: ☐ On ☐ Off

Alarm Setup

Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			

Abnormal value:	Alarm delay:	Deadband:

Unit Tag: Point #: Page of

Ind Sqrt Type Point

Type: ☐ 50 mV ☐ 100 mV ☐ 200 mV ☐ 1 V ☐ 5 V ☐ 10 V ☐ 4–20 mA ☐ 10–50 mA

Display

Point tag:	Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled

Band	Low scale	High scale	Color
1			
2			
3			

Major grid:	Submajor grid:	Minor grid:
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E		
Normal color:	Alarm color:	

Input Source

☐ Local	☐ MM120/MX60 Ports: Box: Card: Relay:

Input & Output

	Low scale	High scale		Low scale	High scale
Input (V):			Output:	Not programmable	
Filter:			Current: ☐ On ☐ Off		

Alarm Setup

Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			

Abnormal value:	Alarm delay:	Deadband:

Unit Tag: Point #: Page of

Dry Contact Type Point			
Display			
Point tag:		Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled	
Band	Low scale	High scale	Color
1			
2			
3			
Major grid:	Submajor grid:	Minor grid:	
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E			
Normal color:		Alarm color:	
Input Source			
☐ Local	☐ MM120/MX60 Ports: Box: Card: Relay:		
Alarm Setup			
Alarm	Type		Contact
1	☐ None ☐ Abnormal ☐ Open ☐ Close		
2	☐ None ☐ Abnormal ☐ Open ☐ Close		
3	☐ None ☐ Abnormal ☐ Open ☐ Close		
4	☐ None ☐ Abnormal ☐ Open ☐ Close		
5	☐ None ☐ Abnormal ☐ Open ☐ Close		
Abnormal value:	Alarm delay:		

Unit Tag: Point #: Page of

Calculated Type Point: High Peak, Low Peak, Time Average

Display

Point tag:	Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled

Band	Low scale	High scale	Color
1			
2			
3			

Major grid:	Submajor grid:	Minor grid:
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E		
Normal color:	Alarm color:	
Base point:		

Reset Control

Event:	Reset time: Auto: ☐ Off ☐ Daily ☐ Weekly ☐ Monthly Start (hh:mm): Interval (hh:mm):
	Continue after power cycle: ☐ Yes ☐ No

Alarm Setup

Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			

Abnormal value:	Alarm delay:	Deadband:

Unit Tag: Point #: Page of

Calculated Type Point: High-Low Difference

Display

Point tag:	Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled

Band	Low scale	High scale	Color
1			
2			
3			

Major grid:	Submajor grid:	Minor grid:
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E		
Normal color:	Alarm color:	
First point:	Last point:	

Alarm Setup

Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			

Abnormal value:	Alarm delay:	Deadband:

Unit Tag: Point #: Page of

Calculated Type Point: Moving Average			
Display			
Point tag:		Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled	
Band	Low scale	High scale	Color
1			
2			
3			
Major grid:	Submajor grid:	Minor grid:	
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E			
Normal color:		Alarm color:	
Base point:		Time period (min):	

Alarm Setup				
Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
Abnormal value:	Alarm delay:	Deadband:		

Unit Tag: Point #: Page of

Calculated Type Point: Gated Timer

Display

Point tag:		Eng. units:
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled

Band	Low scale	High scale	Color
1			
2			
3			

Major grid:	Submajor grid:	Minor grid:
Decimal fix: ☐ 0		
Normal color:		Alarm color:
Gate point:		

Reset Control

Event:	Reset time: Auto: ☐ Off ☐ Daily ☐ Weekly ☐ Monthly Start (hh:mm): Interval (hh:mm):
	Continue after power cycle: ☐ Yes ☐ No

Alarm Setup

Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			

Abnormal value:	Alarm delay:	Deadband:

Unit Tag: Point #: Page of

Calculated Type Point: Totalize

Display

Point tag:	Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled

Band	Low scale	High scale	Color
1			
2			
3			

Major grid:	Submajor grid:	Minor grid:
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E		
Normal color:	Alarm color:	
Base point:	Low flow cutoff:	Flow rate: ☐ /sec ☐ /min ☐ /hour ☐ /day

Reset Control

Event:	Reset time: Auto: ☐ Off ☐ Daily ☐ Weekly ☐ Monthly Start (hh:mm): Interval (hh:mm):
	Continue after power cycle: ☐ Yes ☐ No

Alarm Setup

Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			

Abnormal value:	Alarm delay:	Deadband:

Unit Tag: Point #: Page of

Equation Type Point			
Equation:			
Display			
Point tag:		Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled	
Band	Low scale	High scale	Color
1			
2			
3			
Major grid:	Submajor grid:	Minor grid:	
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E			
Normal color:		Alarm color:	

Alarm Setup				
Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
Abnormal value:	Alarm delay:	Deadband:		

Unit Tag: Point #: Page of

Conditional Type Point		
Equation:		
Display		
Point tag:	Eng. units:	
Low scale:	High scale:	
Major grid:	Minor grid:	
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E		
Normal color:	Alarm color:	
Base point:	Low flow cutoff:	Flow rate: ☐ /sec ☐ /min ☐ /hour ☐ /day

Alarm Setup

Alarm	Type	Contact
1	☐ None ☐ Abnormal ☐ True ☐ False	
2	☐ None ☐ Abnormal ☐ True ☐ False	
3	☐ None ☐ Abnormal ☐ True ☐ False	
4	☐ None ☐ Abnormal ☐ True ☐ False	
5	☐ None ☐ Abnormal ☐ True ☐ False	

Alarm delay:

Unit Tag: Point #: Page of

External Type Point			
Display			
Point tag:		Eng. units:	
Low scale:	High scale:	Bands: ☐ Enabled ☐ Disabled	

Band	Low scale	High scale	Color
1			
2			
3			

Major grid:	Submajor grid:	Minor grid:
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E		
Normal color:		Alarm color:

Input & Output

	Low scale	High scale		Low scale	High scale
Input (V):			Output:		
Timeout:					

Alarm Setup

Alarm	Type	Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate			

Abnormal value:	Alarm delay:	Deadband:

Unit Tag: Point #: Page of

SM100 Type Point					
Display					
Point tag:			Eng. units:		
Major grid:			Minor grid:		
Low scale:			High scale:		
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E					
Normal color:			Alarm color:		
Input					
SM100 select: Modbus: Description:			SM100 input #:		
Alarm Setup					
Alarm	Type		Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate				
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate				
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate				
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate				
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate				
Alarm delay:		Deadband:			

Unit Tag: Point #: Page of

Modbus Type Point					
Display					
Point tag:			Eng. units:		
Low scale:		High scale:		Bands: ☐ Enabled ☐ Disabled	
Band	Low scale		High scale		Color
1					
2					
3					
Major grid:		Submajor grid:		Minor grid:	
Decimal fix: ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ E					
Normal color:			Alarm color:		
Alarm Setup					
Alarm	Type			Set point	Contact	Rate (s)
1	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate					
2	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate					
3	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate					
4	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate					
5	☐ None ☐ Abnormal ☐ High ☐ Low ☐ Rate					
Abnormal value:		Alarm delay:		Deadband:		
Slave Setup					
Type: ☐ Serial ☐ Ethernet		ID:		IP:	
Ethernet only: Encapsulated: ☐ Yes ☐ No			Ports:		
Register:			Data type:		
Byte Swap: ☐ Yes ☐ No			Word Swap: ☐ Yes ☐ No		
Input scale: Low:			High:		
Output scale: Low:			High:		

Cell Explanations

Auto, Reset: Assign as on or off; if on, assign time/day for daily, weekly, or monthly

Base Point: Assign a point as the base point

Colors: Assign the normal and alarm colors for a point

Compensation: Assign local or remote compensation for thermocouple points

Contact Output Number, Alarm: Assign each of the alarm set points to one of the 18 optional contact outputs; enter 0 for no contact output assignment

Currents: Enable or disable (Yes or No) current source for measuring resistance

Deadband, Alarm: Applies to alarm set points (Hi or Lo); difference between the value of when the point goes into alarm and the value of when the alarm is cleared

Deadband, Reset: Enter the allowable deadband around the target temperature for sterilization

Decimal: Enter a decimal fix of 0 to E (Exponential); separates the integer part of the number from the fractional part (Dec. Fix = 2; 100.75)

Degree: Select °F or °C

Delay, Alarm: Assign the delay time before an alarm activates

Display Grid: Assign the number of major and minor grids to be displayed

Display Scale: Assign the low and high scale ends on the display

Equation: Enter an equation formula for this point

Event, Reset: Assign an event number to reset a point (reset type points only)

Filter: Enter the number of filter seconds

Flow Rate: Assign a flow rate units of /sec, /min, /hour, or /day for totalize points

Gate: Assign a gate or do not (yes or no)

Input Scale, High End: Enter high end of input voltage range

Input Scale, Low End: Enter low end of final engineering units output

Interval, Reset: Enter the time, weekday, or day of month for a reset interval

Last Base Point: Assign a point as the last base point in a series

Low Flow Cutoff: Assign a low value to stop totalization

Offset: Assign thermocouple offset correction value

Output Scale, High End: Enter high end scale value or exponential value for Log calculation

Output Scale, Low End: Enter low end scale value or exponential value for Log calculation

Period, Time: Assign the time length of the moving window, Gated Timer

Point #: Enter desired number (01 through 36)

Point, Compensation: Assign remote compensation point number

Rate, Alarm: Enter rate of change value in engineering units (based on per minute change)

Reference Temperature: Enter the reference temperature for sterilization

Save on Reset: Yes or No

Set Point, Alarm: Enter the alarm set point values that relate to areas within the range of the chart scale values; if no alarm required, enter NONE

Set Point, Alarm: Assign a set point for an alarm

Span: Assign thermocouple span correction value

Start, Reset: Enter the start time in hours and minutes

Tag, Point: Enter 10-character (maximum) descriptive phrase identifying each point

Target Temperature, Reset: Enter the target temperature for sterilization

Time Period: Assign a time period in seconds for Moving Average type points

Time-out: Enter the time period programmed between signal updates before flagging the point invalid

Type, Alarm: Assign the alarm type of None, High, Low, Rate, Abnormal, Open, or Closed

Type, Point: Define the type of signal input to be measured (J/TC, RTD, 4–20 mA, etc.) or math calculation to be performed (Addition, Square Root, etc.).

Units: Enter the five-character (maximum) engineering unit description assigned to current and voltage inputs and calculated points; for thermocouples and RTDs, select either °C or °F

Z Constant: Enter the constant value for sterilization

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Appendix D
Unit Programming Forms

Use the forms on the following pages to record data as you program the unit. Make copies as needed.

Unit Tag: Page of

Date & Time	
Display format: ☐ American ☐ European	Time:
Daylight Saving Time: ☐ Yes ☐ No	Date:
Point Groups	
Group 1 point assignment:	Group 2 point assignment:
Group 3 point assignment:	Group 4 point assignment:
Group 5 point assignment:	Group 6 point assignment:
Group 7 point assignment:	Group 8 point assignment:
Group 9 point assignment:	Group 10 point assignment:
Group 11 point assignment:	Group 12 point assignment:
Group 13 point assignment:	Group 14 point assignment:
Group 15 point assignment:	Group 16 point assignment:
Group 17 point assignment:	Group 18 point assignment:
Group 19 point assignment:	Group 20 point assignment:
Group 21 point assignment:	Group 22 point assignment:
Group 23 point assignment:	Group 24 point assignment:
Group 25 point assignment:	Group 26 point assignment:
Group 27 point assignment:	Group 28 point assignment:
Group 29 point assignment:	Group 30 point assignment:
Group 31 point assignment:	Group 32 point assignment:

Unit Tag: Page of

Screens		
Screen #: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 (Combo type only)		
Screen name:		
Type: ☐ H-Trend ☐ V-Trend ☐ C-Trend ☐ Alarm/Event ☐ H-Bargraph ☐ V-Bargraph ☐ Overview ☐ Digital ☐ None		
Point group (all but Alarm/Event, Overview, None):	Multi-Group (H- & V-Trend only): ☐	
Time rotation (C-Trend only): ☐ 1 hour ☐ 2 hours ☐ 6 hours ☐ 8 hours ☐ 12 hours ☐ 24 hours ☐ 48 hours ☐ 1 week ☐ 2 weeks ☐ 4 weeks		
Stop at rotation end (C-Trend only): ☐ Yes ☐ No		
Background color (all but Alarm/Event, Overview, None):	Grid color (H- & V-Trend only):	Display scale (H- & V-Trend only):
Indicator (H- & V-Trend only): ☐ Bar ☐ Pointer	Trace width (H - & V-Trend only): ☐ Narrow ☐ Medium ☐ Wide	
Review background color (H- & V-Trend only):	Review grid color (H- & V-Trend only):	
Chart speed (H- & V-Trend only): Low: High:		
Zone mode (H- & V-Trend only):	Low end: %	High end: %
Combo screens: Top-left: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 Top-right: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 Bottom-left: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 Bottom-right: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8		

Unit Tag: Page of

History	
Memory Storage	
Point group (1–32):	Sample rate (s):
Media Storage	
History A	History B
Point group:	Point group:
Media: ☐ Primary ☐ Secondary	Media: ☐ Primary ☐ Secondary
Store data: ☐ Value ☐ Average ☐ Minimum ☐ Maximum	Store data: ☐ Value ☐ Average ☐ Minimum ☐ Maximum
Trigger: ☐ Interval ☐ Alarm ☐ Switch Sync time: Normal rate: Alarm rate: Stop mode: ☐ Alarm clear/ switch open ☐ Sample count	Trigger: ☐ Interval ☐ Alarm ☐ Switch Sync time: Normal rate: Alarm rate: Stop mode: ☐ Alarm clear/ switch open ☐ Sample count
History on: ☐ Yes ☐ No	History on: ☐ Yes ☐ No
Media review enabled: ☐ Yes ☐ No	

Ports		
Serial		
Modbus (1-255):		
Port:	RS232	RS485
Protocol:	☐ RTU ☐ ASCII	☐ RTU ☐ ASCII
Baud rate:	☐ 1200 ☐ 2400 ☐ 4800 ☐ 9600 ☐ 14400 ☐ 19200 ☐ 38400	☐ 1200 ☐ 2400 ☐ 4800 ☐ 9600 ☐ 14400 ☐ 19200 ☐ 38400
Bits/Char:	☐ 7 ☐ 8	☐ 7 ☐ 8
Parity:	☐ None ☐ Odd ☐ Even	☐ None ☐ Odd ☐ Even
Stop bits:	☐ 1 ☐ 2	☐ 1 ☐ 2
Float format:	☐ 1x32 ☐ 2x16	☐ 1x32 ☐ 2x16

Unit Tag: Page of

Ports, cont.					
Ethernet					
IP address:		Subnet mask:		Gateway:	
FTP config client user name:			FTP config client password:		
Web ports:			Float format: ☐ 1x32 ☐ 2x16		
FTP Files Client Login					
User	User name	Password	User	User name	Password
1			4		
2			5		
3			6		
Media accessed: ☐ Primary ☐ Secondary			Media accessed: ☐ Primary ☐ Secondary		
Host FTP Server Config					
FTP Connection: Primary			**FTP Connection: Secondary**		
IP address:			IP address:		
Port:			Port:		
Login name:			Login name:		
Password:			Password:		
Account:			Account:		
Initial path:			Initial path:		
Auto media file FTP transfer: ☐ Yes ☐ No			Transfer time:		
Always transfer to both servers: ☐ Yes ☐ No			Passive transfer: ☐ Yes ☐ No		

Unit Tag: Page of

Ports, cont.

SM100

Interface: ☐ Serial ☐ Ethernet

Modbus	IP	Description	Modbus	IP	Description

Measurement

Mode: ☐ Live ☐ demo	Rejection: ☐ 60 Hz ☐ 50 Hz
TCBO check: ☐ On ☐ Off	Span & Offset: ☐ Yes ☐ No

Digital I/O

Standard alarm contacts: ☐ Open on alarm clear ☐ Open on acknowledge
☐ Failsafe contacts ☐ Reflash contacts

Common alarm contacts: ☐ Link to media status ☐ Link to unit fault ☐ Link to point alarms
☐ Open on alarm clear
☐ Open on acknowledge

Switch: 1 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks
☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank
☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 2 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks
☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank
☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Unit Tag: Page of

Digital I/O, cont.

Switch: 3 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 4 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 5 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 6 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 7 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 8 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 9 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 10 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Unit Tag: Page of

Digital I/O, cont.

Switch: 11 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 12 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 13 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 14 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 15 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 16 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 17 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 18 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Unit Tag: Page of

Digital I/O, cont.

Switch: 19 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 20 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 21 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 22 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 23 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 24 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 25 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 26 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Unit Tag: Page of

Digital I/O, cont.

Switch: 27 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 28 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 29 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 30 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 31 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 32 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 33 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 34 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Unit Tag: Page of

Digital I/O, cont.

Switch: 35 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 36 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 37 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 38 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 39 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 40 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 41 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 42 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Unit Tag: Page of

Digital I/O, cont.

Switch: 43 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 44 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 45 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 46 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 47 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 48 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 49 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 50 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Unit Tag: Page of

Digital I/O, cont.

Switch: 51 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 52 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 53 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 54 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 55 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 56 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 57 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 58 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Unit Tag: Page of

Digital I/O, cont.

Switch: 59 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Switch: 60 Function: ☐ None ☐ Event ☐ ACK Alarm ☐ Chart Speed ☐ Alarm Checks ☐ Recording ☐ Freeze Unit ☐ Clear Unit ☐ Screen Blank ☐ Screen Advance ☐ Screen Capture

Open message: Close message:

Display Control

Normal intensity: ☐ High ☐ Medium ☐ Low ☐ Custom:

Screen saver intensity: ☐ High ☐ Medium ☐ Low ☐ Custom Wait:

Digital display: ☐ Alarm blink ☐ Display point number ☐ Display point tag: ☐ White ☐ Black

Chart speed:	Auto speed: ☐ On ☐ Off	Speed unit: ☐ inch/hour ☐ mm/hour
Clear unit at startup: ☐ Yes ☐ No		Startup screen:
Enable auto screen change: ☐ Yes ☐ No		Cycle interval: ☐ Periodic ☐ On alarm

Screens: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

System

Unit ID: Language: ☐ English ☐ Spanish ☐ French ☐ German ☐ Chinese

Program passcode:

- ☐ Date & time
- ☐ Point groups
- ☐ History
- ☐ Measurement
- ☐ Display control
- ☐ Media control
- ☐ Points
- ☐ Screens
- ☐ Ports
- ☐ Digital I/O
- ☐ System
- ☐ File I/O

Function passcode:

- ☐ Recording on/off
- ☐ Alarm checks
- ☐ Reset point
- ☐ Display previous
- ☐ Chart speed
- ☐ ACT/BYP point
- ☐ Trend message

Media Control		
Primary media: ☐ None ☐ Floppy	Secondary media: ☐ None ☐ PC card ☐ Zip	
Primary fail contact:	Secondary fail contact:	
Media alert interval (min):	Config file media: ☐ Primary ☐ Secondary	Storage mode: ☐ Compress ☐ ASCII
Media mode: ☐ Fill ☐ Wrap	Primary fill %:	Primary fill contact:
	Secondary fill %:	Secondary fill contact:

Function Menu		
Recording: ☐ On ☐ Off	Chart speed: ☐ High ☐ Low	Alarm check: ☐ On ☐ Off

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Appendix E
ProView Plus Software

The ProView Plus software allows you to view real-time data and analyze and report historical data from a remote PC via several communications port options. This software requires a PC running Microsoft Windows NT/95/98/2000/ME/XP. The files produced by the recorder are in MSDOS compatible format, and you can utilize the File Manager to copy, move, save, and/or rename the files.

1. Insert the CD into the drive.

2. The autostart file opens a menu. Select **ProView**.

   If the program does not autostart from the CD, select Start > **Run**, and browse to find your CD drive. Double click the Autorun.exe file, and a dialog box appears, allowing you to select the menu item you want.

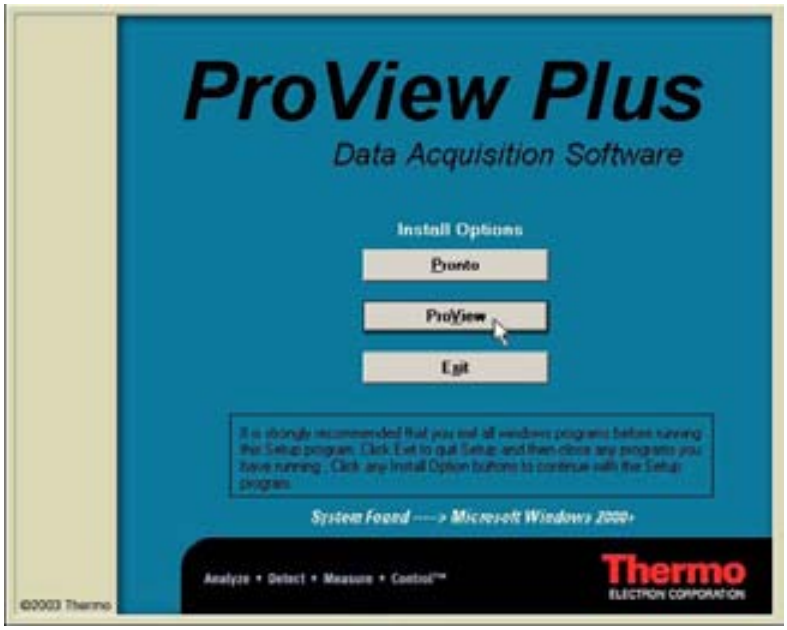

Figure E–1.

The installation process places a shortcut labeled **SV180-SV280 Configurator** on your desktop. Open ProView Plus to begin the configuration process. The program interface is similar to most standard Microsoft Windows-based programs. The Program and Function menus are identical to those displayed by the recorder.

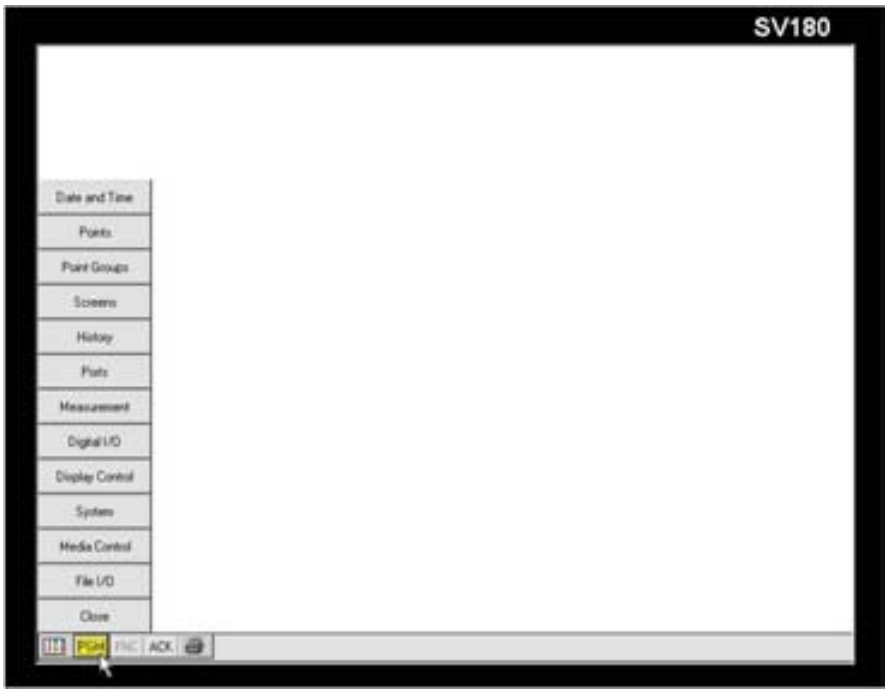

Figure E–2. Program menu in ProView Plus

Figure E–3. Function menu in ProView Plus

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